RUPTURE OF AN INTRACRANIAL ANEURYSM DURING CEREBRAL ANGIOGRAPHY

KENNETH G. JAMIESON, M.S. (Melb.)
Repatriation General Hospital, Heidelberg, Victoria, Australia

(Received for publication July 14, 1954)

Cerebral angiography is now well established as a valuable means of investigating patients with a variety of intracranial lesions, and is being used more generally and more frequently. That it is not free from danger is apparent from the several deaths and many cases of hemiplegia that have been reported as complications (for example, see Rowbotham et al.2). The present case warrants separate report, as an intracranial aneurysm was seen radiographically to have been ruptured during the procedure.

CASE REPORT

A man aged 36 years was admitted on Feb. 3, 1954. Two days before, during strenuous exertion, he had experienced a sudden severe pain which began in the nape of the neck and spread over the head. He lost consciousness for about 1 hour and awoke with severe headache, a stiff neck and blurred vision, and vomited copiously. Examination then revealed no abnormality other than stiffness of the neck. Lumbar puncture yielded heavily blood-stained CSF.

Examination. On admission he still complained of headache, which was subsiding, and showed no abnormal neurological signs. The CSF was yellow and pressure was 180 mm. CSF. A diagnosis of ruptured intracranial aneurysm was made.

Course. After 1 week the patient was free of headache.

Angiography. Percutaneous injection of both common carotid arteries was performed under local anaesthesia on Feb. 10, 1954, and an aneurysm was demonstrated on the left middle cerebral artery, about half-way out the Sylvian fissure. The site of origin of the aneurysm was not well seen, nor whether it had an accessible neck.

The patient remained free of symptoms during the next week, but surgical treatment was deemed advisable. It was thought that the operation of choice would be carotid ligation in the neck, but to decide the possibility of a direct intracranial attack, further angiography was undertaken on Feb. 17, 1954, with the object of obtaining two further views.

The left common carotid artery was again punctured under local anaesthesia, and by the injection of 15 ml. of 40 per cent Urodone a good anteroposterior view of the intact aneurysm was obtained through the orbit (Fig. 1). The other view required was an oblique lateral, to separate the aneurysm from bony shadows. Three injections were made to obtain this view—the first two films were fogged because the exposure was angled across the plane of the grid lines, but this error was then recognized and corrected and the next injection resulted in the picture seen in Fig. 2. Immediately after this injection, the needle was withdrawn from the artery (since success seemed assured) and the patient was removed to the waiting room. When the film was developed, the rupture was recognized and the patient was questioned regarding the effect of the injections. The first three injections had produced the usual feeling "like scalding water" up the left side of the face. The last injection had caused a similar sensation together with a sudden severe left frontal headache, which was still present. His speech was already a little hesitant. Examination showed no other abnormality at this stage, except for slight dilatation of the left pupil (a not uncommon effect of angiography).
FIG. 1. A-P projection of common carotid angiogram. The middle cerebral aneurysm is intact.

Course. The patient was returned to bed, and an early operation was planned. There was no apparent change in his clinical state until 1 hour later, when an epileptic fit commenced on the right side and resulted in unconsciousness. The left pupil was then smaller than the right, but it rapidly dilated and a left medial rectus palsy developed as unconsciousness deepened. An elevated B.P. (180 mm. Hg systolic) and slow deep respirations completed the picture of cerebral compression.

Operation (performed by Mr. R. S. Hooper under endotracheal gas and oxygen anaesthesia with controlled hypotension). A left frontotemporal osteoplastic flap was reflected and incision of the tense dura mater exposed the swollen Sylvian region. There was much subarachnoid blood in the cerebral sulci, and the high tension prevented retraction of the frontal lobe for the usual approach to the aneurysm via the Sylvian fissure. Brain needleling encountered a large intracerebral haematoma at a depth of 3 cm., and this was evacuated by aspiration and by incision of the overlying cortex. The aneurysm was then found to be wrapped around the front of one of the middle cerebral branches, which had to be clipped to control the severe haemorrhage that resulted from dissection.

Course. After the operation the patient appeared definitely improved, but there were signs of decerebrate rigidity. Ten hours later his condition deteriorated, and cardiac and respiratory arrest occurred. Cardiac massage restored regular strong cardiac contractions, but spontaneous respiration did not recover and death soon followed.

DISCUSSION

The controversy that has raged over the advisability of early angiography in cases of spontaneous subarachnoid haemorrhage has largely been settled. The great importance of the information so to be gained, without which surgical treatment cannot be planned, considerably outweighs the risk of rupture of an aneurysm by the injections. Indeed, this risk has seemed rather remote. In the present instance there is a clear demonstration of such an occurrence. In Fig. 1 the aneurysm is intact and in Fig. 2 it has ruptured, while the onset of headache was during the last injection.

The fountain of dye seen spurting from the aneurysm well illustrates the force
RUPTURE OF ANEURYSM DURING ANGIOGRAPHY

with which such a haemorrhage may tear the brain substance, especially when adhesion of the aneurysmal sac to the brain has resulted from a previous subarachnoid haemorrhage. The rapid progression of neurological abnormalities, from headache and dysphasia to coma and cerebral compression is also evidence of the major character of the haemorrhage. It is unusual for haemorrhage to be actually shown by angiography, the only other case in my series being an extradural haematoma in which the bleeding point on the middle meningeal artery was visualized.\textsuperscript{1}

At this Hospital, 40 per cent Urodone has been used routinely for cerebral angiography, as this concentration appears to be necessary to obtain adequate contrast in the anteroposterior projection in particular. The amount of dye in the syringe for each injection is not more than 15 ml., except for cross-circulation tests, when up to 20 ml. are used. Not all of this is injected, the last 1–2 ml. being retained in the downward-pointed syringe as an additional precaution against the introduction of air bubbles (for these or clots caused by inadequate technique may account for a proportion of the reported complications). The pressure applied is that of the thumb on the plunger, which delivers the dye in 2–3 seconds through a 3-inch 18 G. needle.

The degree of vascular disturbance caused by radio-opaque solutions of the iodic group may be seen from the bright facial flush and scalding which follow injection. In this patient it was noticed that the flush was preceded by an intense unilateral pallor, which lasted about 5 seconds. That the cerebral vessels may behave similarly is suggested by the frequent finding of some degree of arterial spasm in the films—for example, in the carotid siphon in Fig. 2. Occasionally spasm may account for complete non-filling of one or more cerebral vessels which have been demonstrated in other injections. In one instance recently the internal carotid artery appeared to end blindly just below its bifurcation, while the ophthalmic and anterior

\textbf{FIG. 2.} Subsequent lateral projection shows rupture of the aneurysm with escaping jet of dye.
choroidal branches were filled to the periphery, showing that the exposure was correctly timed. A subsequent injection showed the cerebral vessels fully. (No neurological disturbance occurred in this patient.) Further, the sudden facial scalding causes a reflex elevation of blood pressure, which may also be serious.

When one considers the large number of complications that have occurred after use of these dyes, one wonders how much safer they are than thorotrast which, apart from its possible late carcinogenic effect, was non-irritant and gave excellent contrast radiographs in small amounts with slower injection. Certainly the need for a new non-irritant and good contrast dye is great.

This case has been the only serious untoward event in a series of 150 patients who have undergone carotid angiography (in many cases bilateral) at this Hospital in the past 3 years. Two transient complications have occurred. In 1 patient acute bronchospasm developed, which was relieved by the injection of adrenalin. Another became unconscious with profound hemiplegia 5 minutes after the conclusion of the angiogram, presumably from spasm as recovery was complete within 1 hour and no EEG abnormality could then be demonstrated. Comment may be made upon the unfortunate chance that the fourth injection in the present case should have been necessitated by a simple technical error in two previous films.

SUMMARY

1. A case of rupture of an intracranial aneurysm during cerebral angiography is reported, and the radiographic picture of haemorrhage from an aneurysm is presented.

2. The possibility of this complication is a real one, but should not preclude the early use of this valuable diagnostic procedure.

3. The need for a new non-irritant radio-opaque dye is discussed.

I am indebted to the Chairman of the Repatriation Commission of Australia for permission to publish this case. It is a pleasure to thank Mr. R. S. Hooper, Neurosurgeon to this Hospital, for his continued advice and guidance, and for his ready surgical assistance in this case.

REFERENCES
