Rupture of an Intracranial Aneurysm of the Carotid Artery with Ventricular Visualization During Angiography

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Rupture of an intracranial aneurysm during angiography is a rare event (1, 2, 4, 7, 9, 10, 12, 15–17, 20–22, 24, 26, 28, 30, 33, 34, 36–40).
Only nine cases with extravasation of contrast medium into the ventricular system have been published so far (5, 6, 11, 13, 14, 18, 19, 29, 35).
In this paper we present a further observation of such a case.

Case report

Mr. M. Sch., age 52 (patient's history No. 238747/78).
The patient was found in state of coma one hour before admission to our hospital. He had only complained of headaches for the first time 14 days prior to this event. This pain was interpreted as vertebral in origin.
Findings on admission:
Comatose. Restless and agitated. Undirected escape and defense reaction to pain on the right and completely flaccid hemiparesis on the left side. Babinski sign spontaneously positive on the left, not consistently present on the right. Complete right oculomotor palsy, with temporal deviation of the eyeball. Correspondingly the cilio-spinal reflex was negative on the right but also on the left side. The right oculo-cephalic reflex was negative, the left one strongly positive. The left pupil was constricted with a prompt reaction to light. BP 140/85. Pulse rate 80/min., regular. Normal respiration.

Clinical course:

Ninety minutes after the sudden onset of coma and half an hour after admission percutaneous right carotid angiography was performed under general anaesthesia. Injection of 10 ml of 65% angiografin[R]. A large aneurysm near the bifurcation of the right internal carotid artery was visible. The contrast medium flowed into an intracerebrally formed haematoma in the corpus striatum region (Fig. 1). At first, there was incomplete, then after a few seconds adequate filling of the ventricular system with contrast medium (Fig. 2). Ten minutes after the injection there was extravasation into the haematoma and demonstration of a complete ventriculogram (Fig. 3 a and 3 b). No further extravasation demonstrable after a second injection of contrast medium 15 minutes after the first one (Fig. 4). This was regarded as evidence that haemorrhage from the aneurysm had now stopped. The venous phase was not visible even seven minutes after the injection. This was interpreted as indicating a considerable slowing down of the cerebral circulation.
After the angiography the patient developed compression of the brain stem (ponto-bulbar syndrome). Death occurred on the same day.

Comment:

As far as clinical course and angiographic findings are concerned one must assume that haemorrhage from the aneurysm occurred twice in this case. The first and more severe haemorrhage coincided with the sudden onset of coma. During angiography a second haemorrhage from the aneurysm of the internal carotid artery occurred. After extravasation of the contrast medium a haematoma in the region of the corpus striatum could be demonstrated, with later visualization of the ventricular system.

Discussion

The demonstration of a rupture of an intracranial aneurysm during angiography with extravasation of contrast medium raises the question as to whether there is a direct causal relationship between angiog-

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Fig. 1. Angiogram two seconds after injection of contrast medium by direct puncture of the right internal carotid artery: Visualization of a giant internal carotid artery aneurysm with extravasation of contrast medium into an intracerebral haematoma. The right lateral ventricle is partially visible.

Fig. 2. Angiogram five seconds after injection of contrast medium: The contrast medium has been washed out of the aneurysm. The intracerebral haematoma filled with contrast medium remains visible. Now, there is visualization of both lateral ventricles.

raphy and haemorrhage, or whether it was an incidental coincidence.

During angiography a temporary increase in arterial pressure can occur which possibly contributes to a new rupture of the aneurysm. Bergleiter (3) was able to demonstrate a rise in blood pressure of 5–30 mm Hg in the internal carotid artery distal to the point of puncture. Lin et al. (23), Nadjmi et al. (27) and Fiebach and Liesegang (8) found a rise of intra-arterial pressure of up to 30 mm Hg in the carotid artery during retrograde brachial angiography. Nevertheless we think that further haemorrhage from an aneurysm is unlikely to be provoked by an increase in blood pressure during carotid angiography. On the one hand fluctuations of blood pressure to the extent reported above are frequent and unavoidable, especially in patients with acute subarachnoid haemorrhage. On the other hand haemorrhage from an aneurysm during angiography is rarely observed. In a cooperative study of intracranial aneurysm and subarachnoid haemorrhage Sahs et al. (32) were able to demonstrate that among 5484 patients there was only one case of extravasation of contrast medium during angiography. Perret and Nishioka (31) reported that recurrent haemorrhage during angiography under general anaesthesia occurred 2.4 times as frequently as when local anaesthesia was used. Therefore attention should be directed to the possible role of anaesthesia in causing a further haemorrhage during angiography.

Experience shows that the risk of a recurrence of haemorrhage is significantly higher during the first days and weeks after the rupture of an aneurysm than later on, and that the incidence of this kind of haemorrhage decreases with the increased interval of time since the first haemorrhage. It is in this light that the report by Koga et al. (20) is significant because they routinely performed angiography on patients with known subarachnoid haemorrhage immediately after admission. In six (!) of a total of 107 cases

Fig. 3 (a+b). Plain film ten minutes after injection of contrast medium: Complete ventriculogram visible. Contrast medium within the haematoma still apparent.

investigated by Koga et al. (20) extravasation was observed. In all six cases angiography was performed only a few hours after subarachnoid haemorrhage had occurred.

The mortality among patients with extravasation of contrast medium due to rupture of an aneurysm is high. In a review of the literature, Kamiyama et al. (18) found 24 Cases. Seventeen of the 24 patients died, which corresponds to a mortality rate of 74%. Massive haemorrhage into the ventricular system (25) leads to ventricular obstruction and peracute increase of intracranial pressure, a condition which generally results in death. So far all the patients in whom extravasation of contrast medium into the ventricles occurred during angiography have died except for one case described by Faulhauer and Mühler (6). This successfully treated case proves that recovery from this kind of haemorrhage is possible and that a fatal end can be avoided if immediate operation is carried out before compression of the brainstem occurs. However this cannot be expected in general. Regular monitoring of traumatic and nontraumatic intracerebral haematomas by computerised tomography has taught us that survival is also possible with conservative treatment. The question as to whether and at what stage surgical intervention is indicated in cases of intracerebral or ventricular haemorrhage remains a difficult and much-discussed problem.

Summary

Rupture of an aneurysm during angiography, with extravasation of blood and contrast medium into the ventricular system occurs rarely.

We wish to add one personal observation to those few cases already published. Haemorrhage from an aneurysm of the internal carotid artery recurred during angiography in a 52-year-old comatose man. Through extravasation of blood and contrast medium

into the ventricles these became fully visible on the X-ray screen. The question of a direct causal relationship between angiography and rupture of an aneurysm, the frequency and risk of this coincidence and mortality are discussed. Since computerised tomography now precedes angiography in cases of subarachnoid haemorrhage, complications arising from angiography could be reduced by proper timing.

Key words:
Angiography – Rupture of an intracranial aneurysm – Frequency – Risk – Mortality – CT.

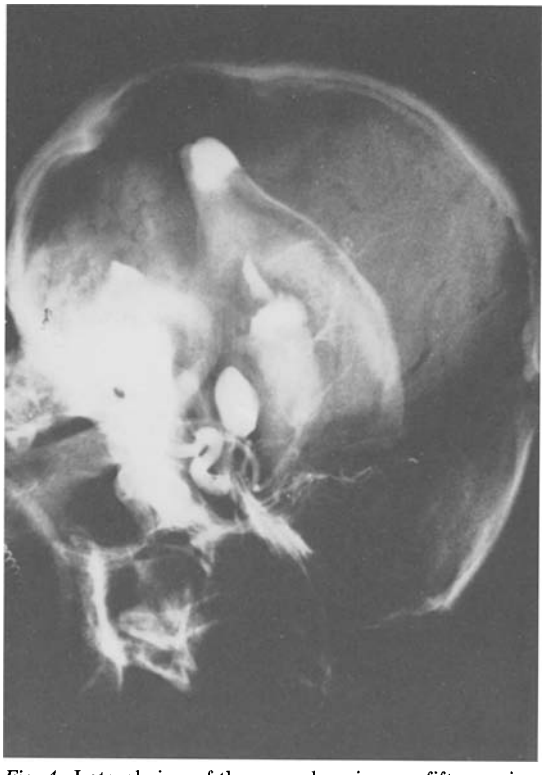

Fig. 4. Lateral view of the second angiogram fifteen minutes later: Haemorrhage from the aneurysm has stopped.

Zusammenfassung

Die Ruptur eines Aneurysmas während einer Angiographie mit Einbruch von kontrastmittelhaltigem Blut in das Ventrikelsystem ist ein seltenes Ereignis.
Den wenigen publizierten Fällen wird eine eigene Beobachtung hinzugefügt. Bei einem bewußtlos zusammengebrochenen 52 Jahre alten Patienten ereignete sich während der Angiographie eine erneute Blutung aus einem Aneurysma der A.carotis interna. Durch Einbruch des mit Kontrastmittel durchmischten Blutes in die Ventrikel kam es zu einer vollständigen Darstellung der Hirnkammern.
Die Frage eines kausalen Zusammenhanges von Angiographie und Ruptur eines Aneurysmas, die Häufigkeit und das Risiko der Koinzidenz und die Mortalität werden diskutiert. Da die computertomographische Untersuchung der Angiographie bei Subarachnoidalblutungen vorausgeht, lassen sich durch richtige Zeitplanung die Komplikationen der Angiographie verringern.

Schlüsselwörter:
Angiographie – Ruptur von intrakranialen Aneurysmen – Häufigkeit – Risiko – Sterblichkeit – CT.

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