

## Aneurysmal Rupture during Angiography

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**Summary.** A case of rupture, during angiography, of a right middle cerebral artery aneurysm with profuse hemorrhage into the subarachnoidal space is presented. Bleeding must have started between the two injections for the frontal and for the lateral carotidograms. The aneurysm that ruptured two days after a closed cerebral trauma was probably traumatic in origin.

**Key words:** Rupture of cerebral aneurysm – Middle cerebral artery – Extravasation of contrast medium – Angiographic demonstration – Traumatic aneurysm.

**Zusammenfassung.** Ein Patient mit Aneurysma-Ruptur der rechten A. cerebri media und profusem Blutaustritt in den Subarachnoidalraum während Angiographie wird beschrieben. Die Blutung begann offenbar zwischen den beiden Carotis-Injektionen für die frontale und laterale Angiographie. Da die Aneurysma-Ruptur 2 Tage nach einem geschlossenen Schädeltrauma entstand, wird eine traumatische Ursache angenommen.

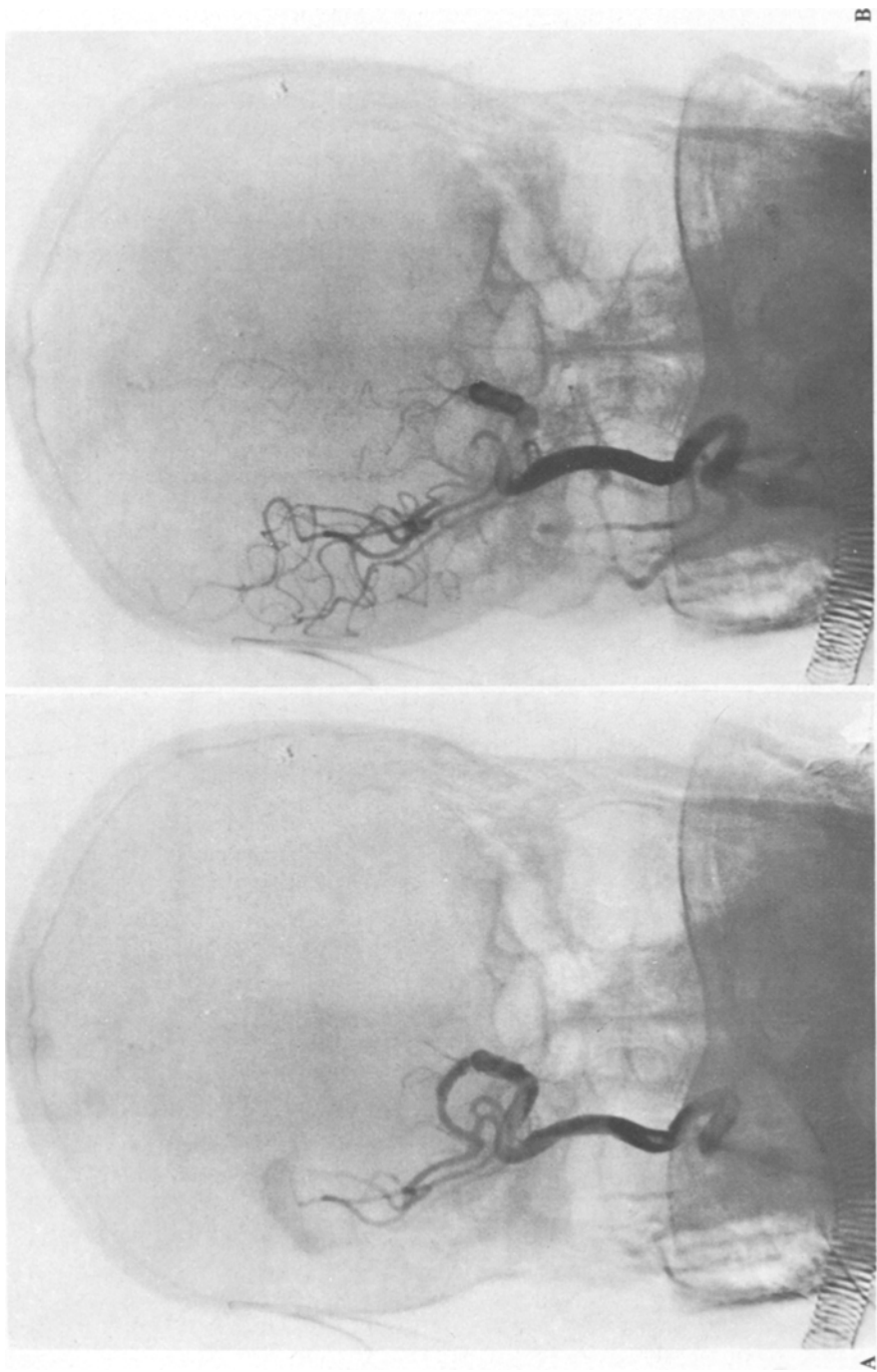
**Schlüsselwörter:** Aneurysma-Ruptur – A. cerebri media – Kontrastmittel-Extravasat – Angiographische Darstellung – Traumatisches Aneurysma.

### Introduction

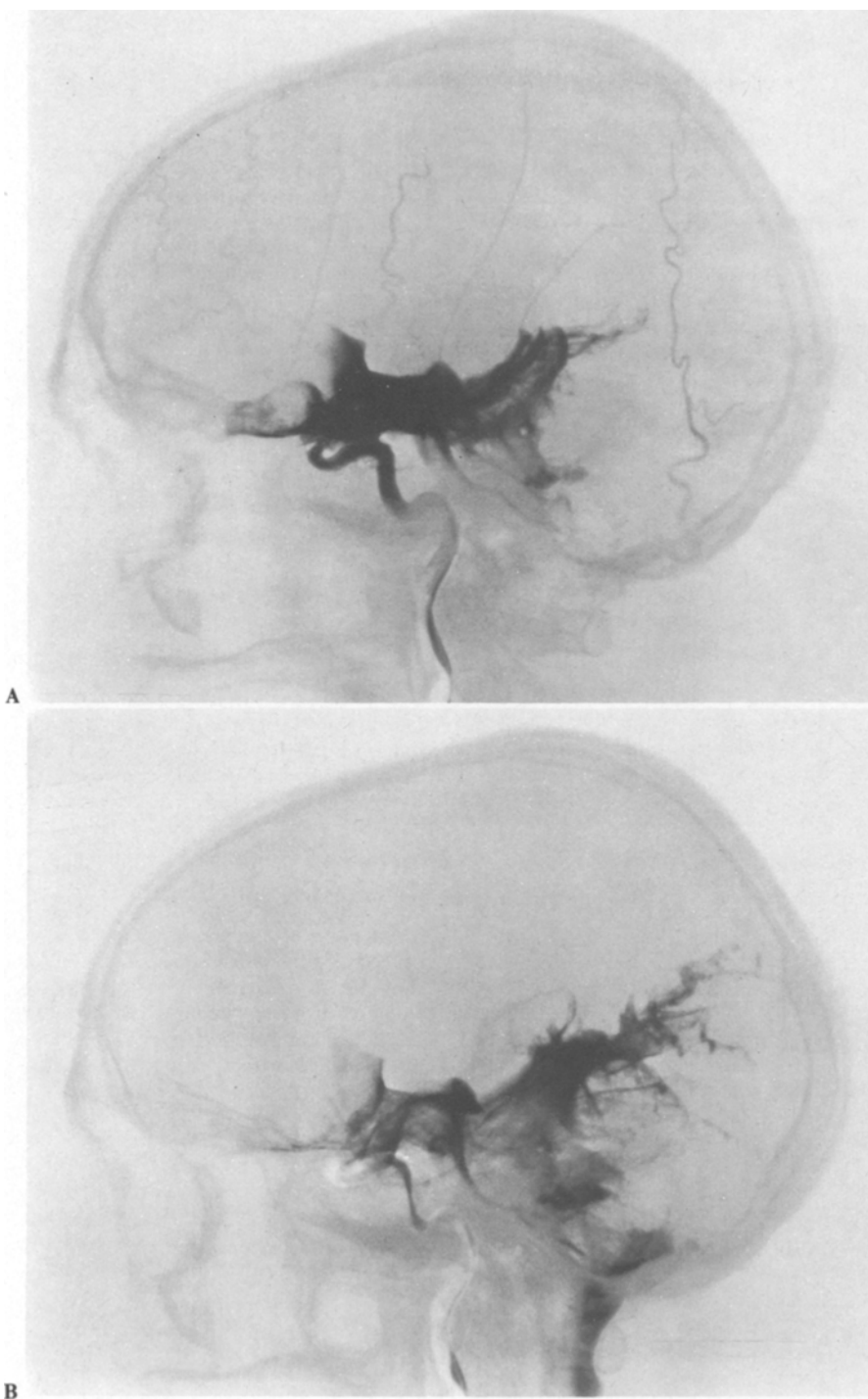
An angiographic demonstration of subarachnoidal hemorrhage due to the rupture of an aneurysm depends on the temporal relation between the incidence of the rupture and the injection of the contrast medium. In the present case, the rupture of an aneurysm of the right middle cerebral artery occurred between the two injections of contrast material for the frontal and for the lateral series. The rupture occurred two days after a closed cerebral trauma. It was probably of traumatic origin.

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**Fig. 1A and B.** Subsequent subtraction photographs from frontal series of right carotidogram showing no extravasation of contrast medium. Discontinuous flow in proximal middle cerebral artery in **B**. No opacification of the aneurysm or the anterior cerebral artery, probably filled from the other side



**Fig. 2A and B.** Subtraction photographs from lateral series of right carotidogram carried out 3 min later, showing profuse extravasation of contrast medium into the subarachnoidal spaces, due to a ruptured aneurysm, which was found on autopsy. **B** approx. 8 s after **A**, showing further distribution of contrast medium as far as into cisterna magna and spinal canal. Excessive arteriosclerotic calcification in the intracranial part of internal carotid artery, not seen due to subtraction technique

## Case Report

A 73-year-old male was found unconscious near a demolished car on a lonely road. Signs of alcoholic intoxication were present. After admittance to the regional hospital, a right parieto-occipital scalp injury was sutured. Due to the development of a cutaneous emphysema in the course of a severe thoracic trauma with serial costal fractures, the patient was transferred next morning to Ulm University Hospital. Neurological examination on admittance was normal and revealed a conscious patient. Skull roentgenograms showed no fractures. There was a parietal monocular hematoma with subcutaneous sugillations only in the right medial and lateral orbital angle. At morning rounds next day, 32h after the trauma, it was observed that the patient used his left arm less frequently than the right. Repeated echoencephalograms within the next hours showed no shift of the midline, and pineal chalk was still exactly medial in control roentgenograms. Nevertheless, a slowly progressing left-sided brachiofacial type of hemiparesis developed including a left-sided hemineglect, increasing drowsiness, and an incipient nasal papilledema on the right side.

### *Right Carotidogram*

The clinical diagnosis of a right subdural hematoma was not confirmed by the carotidograms. In the frontal series, which were carried out first, no extravasation of contrast medium could be seen (Fig. 1). In the lateral series, carried out 3 min after the first series, a gross intracranial hemorrhage was demonstrated with extravasation of contrast medium into the subarachnoidal space (Fig. 2). The anterior cerebral artery was not displayed in the frontal or in the lateral series. The reason could be a hemodynamic one in the 73-year-old man or an arterial spasm due to an earlier hemorrhage, which may have caused the observed hemiparesis. The carotidogram did not show an aneurysm, i.e., the aneurysm found on autopsy did not opacify during angiography. Cerebral arteriosclerosis was present to the extent of massive calcifications in the intracranial part of the internal carotid artery.

Angiographies were carried out under general anesthesia with intratracheal intubation. At the end of the anesthesia, bilateral pupillary dilatation and bradycardia were present. Assisting artificial respiration was necessary. When the patient arrived at the intensive care unit, heart rate and pupillary size normalized and spontaneous breathing returned although showing Cheyne-Stokes' periodicity. In the evening, the patient was still unconscious and reaction to painful stimuli was almost absent, but corneal and oculocephalic reflexes were present. Pupils were now narrow, light reaction was poor, and a bilateral Babinski sign was constantly observed. The EEG was relatively flat with only temporobasal theta- and slow alpha waves. Echoencephalogram now revealed a 5 mm shift of the midline to the left. Cerebral death occurred the same night.

### Autopsy Findings

A large ruptured aneurysm of the right middle cerebral artery was found on autopsy. It was located at the junction of the pars sphenoidalis and the pars insularis of the vessel.

### Comments

This case seems to us of some interest, since to our knowledge such a profuse extravasation of contrast medium in the course of an intracranial hemorrhage has not been previously reported. There are some reports of extravasation of contrast material into the ventricular system to be found in the literature (Butler et al.,

1972; Marc et al., 1973; Teal et al., 1973; Osgood and Martin, 1974; Karadayi et al., 1973). Pia (1968) reviewed 54 cases of intraventricular bleeding (hematocephalus). Arteriographic demonstration of a cerebellar hematoma (Lang, 1969) and extravasation of contrast medium into the basal ganglia (Wolpert and Schatzki, 1972) have been reported. Kowada et al. (1972) published a case with extravasation of contrast medium into the hemispheres due to hypertensive intracerebral hemorrhage, as did Mizukami et al. (1972). Intracerebral leakage of contrast medium during apoplexy was reported by Yamaguchi et al. (1971).

The angiographic visualization of a traumatic intracerebral hematoma was reported by Thierry et al. (1973), and the extravasation of contrast material in the course of cerebral trauma was reviewed by Scharfetter and Twerdy (1973).

In relation to our present case, only one aneurysmal rupture during angiography has been reported (Waga et al., 1973). The literature most closely related to our present case, however, is the report of Lukin and Chambers (1974), who were able to angiographically demonstrate the development of a traumatic aneurysm and its progression to rupture. These authors also review the literature on a traumatic development of a cerebral aneurysm. After their paper, Shirai et al. (1977) reported a case of traumatic aneurysm of the internal carotid artery.

In view of the five previous cases reported by Lukin and Chambers, the aneurysm of the middle cerebral artery in our present case was probably of traumatic origin. Traumatic aneurysms are observed in regions of cerebral contusion and are explained by immediate traumatic influence on the vessel wall. In the present case, extensive cerebral contusion was found on autopsy in the region of the aneurysm, i.e., in the right parietal region. Probably a higher fragility of blood vessels due to age, excessive arteriosclerosis with arterial calcifications, and perhaps alcoholism must also be considered in the present case. The latency of the aneurysmal rupture 2 days after the closed brain injury agrees well with the reports in the literature. The traumatic development of cerebral aneurysms in the course of brain trauma is rare. Nevertheless, it has to be considered among the possible postcontusional complications.

## References

- Butler, A. B., Partain, R. A., Netsky, M. G.: Primary intraventricular hemorrhage. *Neurology (Minneap.)* **22**, 675—687 (1972)
- Karadayi, A., Lindquist, M., Tovi, D.: Rupture of an intracranial aneurysm with ventricular opacification during angiography: Case report. *Neurochirurgia (Stuttg.)* **16**, 59—62 (1973)
- Kowada, M., Yamaguchi, K., Matsuoka, S., Ito, Z.: Extravasation of angiographic contrast material in hypertensive intracerebral hemorrhage. *J. Neurosurg.* **36**, 471—473 (1972)
- Lang, E. K.: Arteriographic demonstration of a cerebellar hematoma. *J. La. State Med. Soc.* **121**, 322—323 (1969)
- Lukin, R., Chambers, A.: Traumatic aneurysm of peripheral cerebral artery. *Neuroradiology* **8**, 1—3 (1974)
- Marc, J. A., Schechter, M. M., Azar-Kia, B.: Intraventricular bleeding from cerebral aneurysmal rupture. *Neuroradiology* **5**, 184—186 (1973)
- Mizukami, M., Araki, G., Mihara, H., Tomita, T., Fujinaga, R.: Arteriographically visualized extravasation in hypertensive intracerebral hemorrhage. *Stroke* **3**, 527—537 (1972)
- Osgood, C., Martin, L. G.: Intraventricular contrast extravasation during carotide angiography. *Surg. Neurol.* **2**, 49—50 (1974)

- Pia, H. W.: The diagnosis and treatment of intraventricular hemorrhages. *Prog. Brain Res.* **30**, 463—470 (1968)
- Scharfetter, F., Twerdy, K.: Kontrastmittelextravasat bei Schädeltraumen. *Fortschr. Röntgenstr.* **119**, 757—759 (1973)
- Shirai, S., Tomono, Y., Owada, T., Maki, Y.: Traumatic aneurysm of the internal carotide artery. *Eur. Neurol.* **15**, 212—216 (1977)
- Teal, J. S., Wade, P. J., Bergeron, R. T., Rumbeaugh, C. L., Segall, H. D.: Ventricular opacification during carotide angiography secondary to rupture of intracranial aneurysm. *Radiology* **106**, 581—583 (1973)
- Thierry, A., Binnert, D., Foissac, J. C., Ballivet, J., Michel, L.: Contrast medium extravasation in traumatic intracerebral hematoma. *Neuroradiology* **5**, 178—180 (1973)
- Waga, S., Kondo, A., Moritaki, K., Handa, H.: Rupture of intracranial aneurysm during angiography. *Neuroradiology* **5**, 169—173 (1973)
- Wolpert, S. M., Schatzki, S. C.: Extravasation of contrast material in the intracerebral basal ganglia. *Radiology* **102**, 83—85 (1972)
- Yamaguchi, K., Uemura, K., Takahashi, H., Kowada, M., Kutsuczawa, T.: Intracerebral leakage of contrast medium in apoplexy. *Br. J. Radiol.* **44**, 689—691 (1971)

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