

*From the Department of Neurosurgery S (Heads: J. H. Rasmussen and V. Knudsen),  
Municipal Hospital, Aarhus,  
Ophthalmic Pathology Laboratory (Head: S. Ry Andersen, M.D.),  
University of Copenhagen, and  
Eye Department (Head: V. Clemmesen, M.D.), Central Hospital,  
Næstved, Denmark.*

## SYMPTOMS AND SIGNS OF INTRACRANIAL ANEURYSMS

### With Particular Reference to Retinal Haemorrhage

BY

J. A. FAHMY

The clinical symptoms and signs in 154 cases of ruptured intracranial aneurysms are reviewed. It is demonstrated that retinal haemorrhage is one of the most important and most common signs (32.4 % – confidence limits 25–40).

It is suggested that fundal haemorrhages be classified on a descriptive basis, grade I being mild retinal haemorrhage, grade II moderately severe cases of pronounced retinal haemorrhage, and grade III severe cases of preretinal or vitreous haemorrhages.

A finding of even small retinal haemorrhages in patients who suddenly lose consciousness, with or without neck rigidity, indicates cerebral angiography.

*Key words:* intracranial aneurysms – subarachnoid haemorrhage – retinal haemorrhage – papilloedema – ocular signs.

Previously a clinical retrospective study (Fahmy et al. 1969) attempted to ascertain the aetiology of fundal haemorrhage in subarachnoid bleeding and, at the same time, to establish the prognostic significance of this finding.

---

Received March 10, 1971.

The present investigation deals with the symptoms and signs, and especially the significance of, retinal haemorrhage in diagnosing intracranial aneurysms.

## Material

The material comprises 154 successive patients with ruptured intracranial aneurysms admitted to the Department of Neurosurgery S, Municipal Hospital, Aarhus, during the period April 1, 1959 to March 31, 1967.

Among these 154 patients, 8 had aneurysms on the anterior cerebral artery, 47 on the anterior communicating artery, 56 on the internal carotid artery, 39 on the middle cerebral artery, and 4 on the basilar artery.

Seventy-nine were females and 75 were males. The youngest patient was 9 years old and the oldest 71; 55 % of the patients were in the age range 40 – 60.

Arteriography was performed in 144 cases. In 10 it could not be performed, as the patients were too debilitated and died shortly after admission. In these cases the diagnosis was confirmed at autopsy.

Subarachnoid haemorrhage was verified in 142 cases, in 81 cases by lumbar puncture, in 89 cases at operation, and in 51 at autopsy.

## Results

On analysing the various symptoms and signs it was found (Table I) that 117 patients (76 %) were *unconscious*, whereas 37 had not been unconscious at any time. However, 2 of them had been somnolent. Ninety-two patients had been unconscious for less than 24 hours, 43 for only a short time. Twenty-five had been unconscious for more than 24 hours, 10 of them for even longer than 48 hours. Eighty-five patients (55.2 %) exhibited *neck rigidity*. In 47 (30.5 %) this sign was definite and marked, whereas in 38 (24.7 %) it was mild and in a few cases doubtful. *Hemiparesis* was present in 41 patients (26.6 %), 27 patients (17.5 %) had definite *facial palsy*, and 10 (6.5 %) were *aphasic*.

A total of 64 patients (41.5 %) exhibited one or more *ocular signs*. From Table II it may be seen that among the various ocular signs, *retinal haemorrhage* was the most common, being present in 50 patients (32.4 %). In 21 patients the haemorrhage was bilateral, in 29 unilateral. There was no definite correlation between unilateral retinal haemorrhage and the side of the aneurysm.

*Papilloedema* was present in 20 patients (12.9 %), in 16 combined with retinal haemorrhage, so that it was only in 4 cases that papilloedema was the only ocular sign. In 15 cases the papilloedema was bilateral, in 5 cases unilateral.

*Table 1.*  
Incidence of various neurological signs in ruptured intracranial aneurysms.

	No. of patients	Unconsciousness	Neck rigidity	Hemiparesis	Facial palsy	Aphasia
Anterior cerebral artery	8	7	6	1	—	—
Anterior communicating artery	47	41	33	11	5	—
Internal carotid artery	56	37	29	15	12	3
Middle cerebral artery	39	29	16	14	10	7
Basilar artery	4	3	1	—	—	—
Total	154	117	85	41	27	10

*Table II.*  
Incidence of ocular signs in ruptured intracranial aneurysms.

	No. of patients	Fundal haemorrhage	Papilloedema / Fundal haemorrhage	Paresis of ocular muscles			Visual field defects
				III.	IV.	VI.	
Anterior cerebral artery	8	2	2/-	-	-	1	-
Anterior communicating artery	47	19	7/7	-	-	-	-
Internal carotid artery	56	17	8/6	10	1	-	2
Middle cerebral artery	39	11	3/3	1	-	1	2
Basilar artery	4	1	-	-	-	-	1
Total	154	50	20/16	11	1	2	5

*Paresis of eye muscles* occurred in 13 patients (8.4 %), 11 having oculomotor paresis, 2 abducens paresis, and 1 trochlear paresis. Only one patient, with aneurysm on the internal carotid artery, showed a combination of oculomotor and trochlear paresis. Oculomotor paresis was found in 10 patients with carotid aneurysm and in one patient with aneurysm on the middle cerebral artery as part of incarceration. In 5 cases paresis of ocular muscles was combined with retinal haemorrhage, in two cases with papilloedema, and in one case with both.

*Visual-field defects* appear to be the most uncommon among ocular signs, being demonstrable in only 5 (3.2 %). The explanation is that in many patients the general condition did not permit proper perimetry.

## Discussion

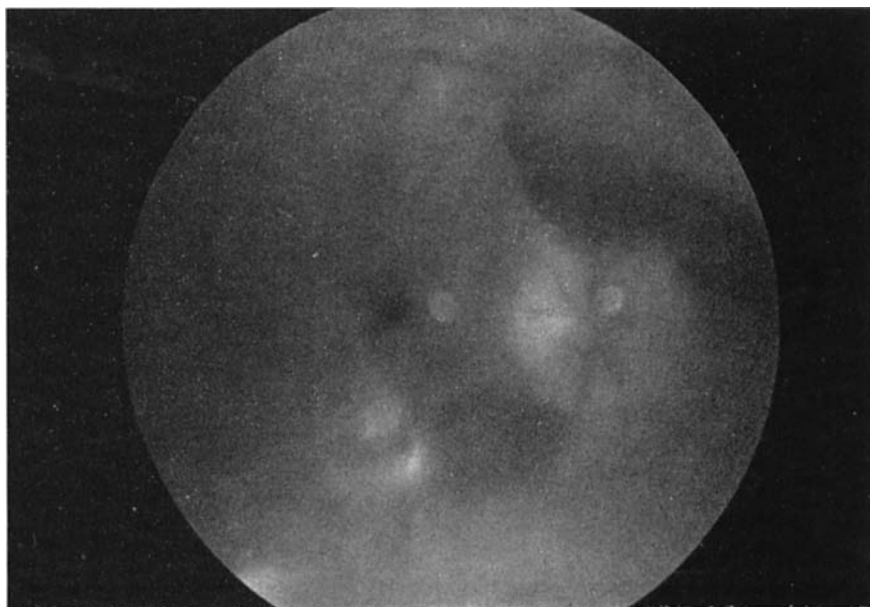
Numerous publications have dealt with intracranial aneurysms from the most diverse aspects, but so far no one appears to have emphasized the great diagnostic importance of retinal haemorrhages, although this sign is present in almost one-third of all patients with ruptured aneurysm. Among 136 patients with aneurysms on the anterior communicating artery, Kraysenbühl & Yasargil (1959), found papilloedema in 33, retinal haemorrhages in 20, hemiparesis in 16, and aphasia in 11.

In the present material retinal haemorrhage proved to be the most common sign after unconsciousness and neck rigidity. The retinal haemorrhage occurs almost simultaneously with subarachnoid haemorrhages (Manschot 1944, Walsh & Hoyt 1969), whereas neck rigidity often does not develop until hours after the haemorrhage. There may be patients who are deeply unconscious with severe subarachnoid haemorrhage who do not exhibit neck rigidity.

As to the shape and site of the retinal haemorrhages there is still some difference of opinion. Riddoch & Goulden (1925) found that in most cases the haemorrhages were small and close to the disc. Walsh & Hoyt (1969) feel that small haemorrhages are most common, but that large preretinal haemorrhages may occur. In their experience, vitreous haemorrhage is rare. According to Manschot (1944), small haemorrhages may occur, but the most typical finding is large preretinal haemorrhage in the vicinity of the disc. Hamby (1952) and Smith et al. (1957), found the most characteristic finding to be preretinal subhyaloid haemorrhage.

From the present material it is apparent that fundus haemorrhages may range in shape from a single streaked retinal haemorrhage to total blood staining of the vitreous, barring any view of the retina.

According to the present results, it was felt most expedient to classify fundal



*Fig. 1.*

Fundal haemorrhage, grade II-III. Several retinal and preretinal haemorrhages in a 66-year-old woman with a ruptured aneurysm on the right carotid artery.



*Fig. 2.*

Fundal haemorrhage, grade III. Vitreous haemorrhages in a 66-year-old man with ruptured aneurysm on the left internal carotid artery.

*Symptoms and Signs of Intracranial Aneurysms*

*Table III.*

Incidence of fundal bleeding in ruptured intracranial aneurysm. (The figures in parentheses indicate vitreous haemorrhages).

	No. of patients	Retinal haemorrhages		Preretinal-vitreous haemorrhages Grade III	Total
		Mild Grade I	Severe Grade II		
Anterior cerebral artery	8	—	2	—	2
Anterior communicating artery	47	4	9	6/(4)	19
Internal carotid artery	56	7	5	5(4)	17
Middle cerebral artery	39	6	5	—	11
Basilar artery	4	—	—	1(1)	1
Total	154	17	21	12(9)	50

haemorrhages clinically into grades (Table III). Grade I signifies mild retinal haemorrhage, i. e. a few small retinal or papillary haemorrhages, grade III severe haemorrhages, i. e. vitreous haemorrhages and large preretinal haemorrhages, whereas grade II represents intermediate cases of pronounced retinal and papillary haemorrhages.

The grading accounts not only for ophthalmological, but also for neuro-surgical aspects, as the vital prognosis is presumably poorest in patients with severe fundal haemorrhages.

Table III shows that the three grades of retinal haemorrhage were, in fact, equally common and that aneurysms on the anterior communicating artery and on the internal carotid artery cause the most severe haemorrhages (grade III).

The site of the haemorrhages was papillary in 5 cases, peripapillary in 22, and diffuse, i. e. peripapillary and peripheral, in 33.

As to its shape, the haemorrhage may be streaked when situated in a layer of nerve fibres and just as often round or flame-shaped when situated on the retinal surface or subretinally.

## Conclusion

From the present findings it may be concluded that retinal haemorrhage is one of the most important and most common signs of ruptured intracranial aneurysms, occurring in 32.4 % (confidence limits 25–40). A finding of even small retinal haemorrhages in patients who have been in good health and who have then suddenly lost consciousness, with or without neck rigidity, supports the diagnosis and indicates angiography. An early diagnosis may be vitally important and decisive from the prognostic as well as therapeutic point of view.

## References

- Fahmy, J. A., Knudsen, V., Andersen, S. Ry (1969) Intraocular haemorrhage following subarachnoid haemorrhage. *Acta ophthalm. (Kbh.)* 47, 550–559.
- Hamby, W. B. (1952) *Intracranial Aneurysms*, p. 270. Charles C Thomas, Springfield, Illinois.
- Krayenbühl, H. & Yasargil, M. G.: (1959) *Das Hirnaneurysma*, p. 33. Docum. Geigy (ser. Chir.) 4, Basel.
- Manschot, W. A. (1944) The fundus oculi in subarachnoid haemorrhage. *Acta ophthalm. (Kbh.)* 22, 281–299.
- Riddoch, G. & Goulden, C. (1925) On the relationship between subarachnoid and intra-ocular haemorrhage. *Brit. J. Ophthalm.* 9, 209–233.
- Smith, D. C., Kearns, T. P. & Sayre, G. P. (1957) Preretinal and optic nerve sheath haemorrhage: Pathologic and experimental aspects in subarachnoid haemorrhage. *Trans. Amer. Acad. Ophthalm. Otolaryng.* 61, 201–211.
- Walsh, F. B. & Hoyt, W. F. (1969) *Clinical Neuro-ophthalmology*, p. 1786, 3rd ed. Williams & Wilkins, Baltimore.

### *Author's address:*

Department of Ophthalmology  
Kommunehospitalet  
Øster Farimagsgade 5  
DK 1399 Copenhagen K  
Denmark.