Cerebral Hemangioblastomas

Review of Literature and Report of Two Personal Cases

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Cerebellar hemangioblastomas, not a rare occurrence in neurosurgical practice, are now well known in their anatomicopathological aspects and, because of their peculiar angiographic appearance, often can be identified preoperatively by vertebrography. Very little is known, on the other hand, about tumors of the same kind occurring elsewhere in the central nervous system, viz. cerebral and spinal hemangioblastomas, since there have been extremely few proven cases. Cushing and Bailey⁵ wrote in 1928 that most of the cases published up to that date as cerebral hemangioblastomas had been labelled erroneously or substantiated insufficiently and that only 4 of them (those of Borchers,⁴ Bielschowsky,⁶ Berger and Guleke,² Schley⁷) could more or less withstand criticism. In 1956 Zülch²⁰ rejected even these and regarded as proven only 2, those reported by Rochat¹⁵ and by Kautzky and Vierdt¹⁰ since Cushing and Bailey’s monograph.

We were therefore sceptical of the 2 cases of supratentorial hemangioblastomas that we had encountered in the past few years and doubted the histological diagnosis very much. However, repeated examination of the slides and postoperative rechecking of the patients led us to the conclusion that we were on firm ground. Moreover, as there are some published cases that Zülch²⁰ apparently had not noticed, we felt that the whole subject deserved review. A point of particular interest in this connexion is that carotidography was performed in our cases and in some of the previous cases and the angiographic features are, in our view, worth considering as a possible aid to preoperative diagnosis.

All the cases published to date, whether in our opinion acceptable or not, are summarised here in some detail whilst our cases are reported fully.

Our 2 cases were found in a series of 1,483 primary supratentorial growths verified at operation at the Neurological Institute of Milan over a period of 16 years (September 1946–August 1962). In the same period of time 34 cerebellar hemangioblastomas were operated upon.

Case Reports

Case 1. Serial No. 4509B (1958). G.D., a boy aged 10, 1 month before admission to the Neurological Institute had a sudden attack of frontal headache and vomiting immediately followed by coma. Lumbar puncture, performed at another hospital, had yielded bloody fluid. On regaining consciousness some hours later, the patient displayed right hemiparesis and left ophthalmoplegia, which did not clear up completely.

Examination. Right pupil was larger than left. There was palsy of the left abducens with limitation of upward and downward rotation of the left bulb. Visual acuity was 10/10 for both eyes; right homonymous hemianopia and mild blurring of optic disks were present. He had right hemiparesis with hyperreflexia and Babinski’s sign.

Electroencephalogram showed slow arhythmic monophasic waves (1–2 c./sec.) in the left temporoparietal region. Left carotidography: in the posterior temporal region, both in arterial and venous phases, there was a roundish, pea-sized, densely contrasted nodule, fed by a branch of the middle cerebral artery and surrounded partially by a small tangle of pathological vessels. Normal vessels surrounding the nodule were displaced peripherally around it (Figs. 1 and 2).

Preoperative Diagnosis. Vascular tumor, possibly hemangioblastoma with surrounding hema-

toma.

Operation (Oct. 9, 1958). Under intratracheal anesthesia with N₂O and ether, a left temporocipital flap was made. In the lower part of the exposed region, immediately underlying the cortex, there was a tangerine-sized collection of darkish blood clots. After emptying, in the wall of the resulting cavity a round, reddish nodule, about 7 mm. in diameter, fed by two small arteries

Received for publication October 1, 1962.
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Figs. 1 and 2. Case 1. Left carotidography. Heavily stained nodule is in the posterior temporal region.

(1–1½ mm. in diameter) was observed and removed completely without difficulty.

Postoperative course was uneventful.

Microscopical Examination. The neoplastic tissue was clearly demarcated by the surrounding cerebral parenchyma and was composed uniformly of vesicular cells with very clear cytoplasm and not very intensely stained central nucleus. The tissue was crossed by blood vessels, in the main very fine and composed of endothelial lining only (Figs. 3 and 4). Fine fibres of reticulin surrounding the blood vessels and spreading through the intervening tissue were stained by the silver–carbonate method (Fig. 5).

Subsequent Course. At follow-up in May 1962 (3½ years after operation), the patient was in good health. There were no abnormal findings excepting right inferior homonymous quadrantanopsia.

Case 2. Serial No. 29742 (1960). D.M.R., a man aged 27, had a 10-year history of episodic dazzling fits in the left eye accompanied by palpitation of the heart and psychic anguish, twice followed by brief loss of consciousness. He had transient bouts of pain in right fronto-orbital region for 3 years; transient blurring for 4 months and finally permanent impairment of vision.

Examination. Positive neurological findings were: mild left motor impairment; deviation to the left when walking with eyes closed; nystagmus

Fig. 3. Case 1. Microphotograph of tumor. Hematoxylin and eosin, X150.
on lateral gaze, brisker when looking to the right; deep reflexes somewhat brisker on the left side; and inconstant Babinski’s sign. Visual acuity was 7/10 on the right, and 6/10 on the left. He had left homonymous hemianopia and bilateral papilledema of 5D.

Electroencephalogram showed slight slowing of electrical activity (7 c./sec.) in the right hemisphere where, posteriorly and chiefly in the parieto-occipital region, there were slow, diphasic, asymmetric waves. Right carotidography: there was a roundish core of abnormal circulation in parieto-occipital region, better visualised in the late arterial phase, supplied by branches of posterior temporal and posterior cerebral arteries; surrounding normal vessels were spread apart (Fig. 6).

Operation (Jan. 13, 1960). Under intratracheal anesthesia with N₂O and ether, a right parieto-occipital flap was made. The gyri were flattened in the central part of the exposed region. One-half cm. below the cortex an apricot-sized, brownish,
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FIG. 6. Case 2. Right carotidography. Late arterial phase: defined spot of pathologic circulation in the posterior parietal region.

resilient, well-circumscribed tumor was found and removed completely.

Postoperative course was uneventful. Fifteen days after operation papilledema had almost completely disappeared but visual acuity had worsened: 3/10 in the right eye and only perception of light in the left eye.

Microscopical Examination. The numerous vessels which crossed the neoplastic tissue were almost all very fine and their walls nearly always consisted of endothelial lining only. In many places this lining sprouted off and the cells of the tumor in the immediate neighbourhood bore a close resemblance to those of the sproutings but lost it at a short distance from the vessels, turning into vesicular cells with very light vacuolar protoplasm. The nuclei were for the most part light and vesicular, though some were darker and denser. In some points there were large cavities of vacuolisation and giant cells (Fig. 7). The silver-carbonate method stains a web of fibres of reticulin which spreads throughout the tumor but is denser around the vessels. (Fig. 8).

Subsequent Course. At follow-up on July 9, 1962 (2½ years after operation) there were no abnormal neurological signs excepting bilateral optic atrophy; visual acuity was 2/50 in the right eye and perception of movement of the hands in the left eye.

Review of Literature

In 1902 Bielschowsky\(^3\) reported the case of a woman, aged 24, who died suddenly after an illness of 14 months' duration (initially dizziness, then unsteady gait and finally vomiting and diplopia). A mural nodule in a cyst of the right frontal lobe was found at necropsy. Bielschowsky thought the tumor was a cavernous angioma. From the microscopical description it appears that the tumor was rich in blood vessels and among them were bundles of connective tissue with stellate or elongated cells; no mention was made of cells resembling "Zwischenzellen." A microscopical drawing at low magnification

FIG. 7. Case 2. Vesicular cells and initial vacuolisation of the tissue. Hematoxylin and eosin, X300.

...
is almost unintelligible. The case therefore remains nonproven.

We have been unable to secure a copy of Borchers' paper, but it should be recalled that Cushing and Bailey wrote "... of the cases that we are inclined to accept, the histological report of all of them except that of Borchers is wanting in detail, and even in Borchers' case damaging criticisms of the diagnosis might be made." This case was rejected by Zülch.

In 1927 Berger and Guleke reported the case of a man aged 24 who, after a blow to the left parietal region, suffered from headache and mild right hemiparesis, which one night suddenly worsened. A cystic tumor (50 cm$^3$ of yellowish fluid) was found in front of the left precentral region at operation. It was soft and fairly well defined and, despite a rich vascularisation, it was removed completely without severe hemorrhage. The patient was quite well 15 months after operation. Berger and Guleke wrote that the tumor was a hemangioblastoma but this bare statement, unsupported by microscopical description, microphotograph or drawing, leaves the diagnosis open to doubt, through the gross appearance might accord with it.

Cushing and Bailey considered the second of the cases reported by Schley in 1927 as a possible example of cerebral hemangioblastoma. The patient was a woman of 48 with a 10-year history of manic-depressive psychosis and a 4-year history of headache, later followed by papilledema, right hemianopia, alexia and apraxia. An egg-sized cyst was found in the left occipital lobe at operation. A small piece of its wall was removed and microscopically it appeared to consist of fine capillaries and wider blood vessels packed together by means of a fine mesh of connective tissue. Schley classified it as a simple capillary and cavernous hemangioma, stating explicitly that there were no pseudoxanthomatous or small giant cells of the type described by Lindau. In our view this case should be rejected.

The tumor described by Dereux and Martin in 1929 also can be ruled out. It was removed from the right cerebral hemisphere of a woman aged 26 with a 9-month history of left jacksonian fits with ensuing left hemiplegia and bilateral papilledema. In the plain roentgenograms there were calcifications in the right central region. The operative record describes a cortical tumor, the size of a walnut, located in the right central region and projecting into a cyst filled with yellowish fluid, but firmly adherent to the
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The tissue was scattered with calcified nodules and consisted of a tangle of vessels, some of them containing angioliths; no mention was made of "Zwischenzellen." One microphotograph is not at all clear and another at higher magnification displays a striking resemblance to a psammomatous meningioma. Dereux and Martin classified the growth as an angiomma but added: "Cushing would say an angioblastoma." In our opinion there is nothing in the gross or microscopical description to warrant the latter diagnosis.

There are some doubts about the case of Vincent et al., although it seems more acceptable than the cases so far cited. The patient, a woman aged 31, had a 1½-year history of left Jacksonian fits and progressive hemiparesis. Left hemiplegia and papilledema were found and roentgen-ray films of the skull disclosed a radio-opaque concretion in the right parietal region. At operation a reddish mural nodule was removed from a tangerine-sized cyst located in the right superior parietal gyrus and filled with yellowish, syrupy fluid. The microscopical description clearly stated that the tumor consisted of blood vessels and of pseudoxanthomatous cells. The blood vessels, sometimes containing angioliths, had thin walls formed by endothelium and perithelium. In some places there was a lacunar system communicating with the vessels. The cellular component consisted of large, round or oval cells with small concentric nuclei; their protoplasm stained blue with the trichrome method of Masson. Fibres of reticulin radiated from the vessels into the lacunar system. This description would seem to support the diagnosis of cerebral hemangioblastoma but the authors themselves were unsure, for they stated that the cellular elements, even if not identical, were very similar to pseudoxanthomatous cells. Moreover, some of the microphotographs failed to show the typical features of hemangioblastomas and the fibers of reticulin are very coarse and scanty. This case too should, we feel, be classed as doubtful.

There is then the case of a woman aged 47 who died after an illness of unknown duration with relapsing coma and in whom Barnard and Walsh found a mural nodule in a cyst of the right Sylvian fissure at necropsy. This tumor seems quite acceptable as both the microscopical sections and the microphotographs revealed fine capillaries with intervening foamy endothelial cells. What makes the case doubtful was the adherence of the tumor to the dura mater. Cushing and Bailey, Zülch, Russell and Rubinstein and others have pointed out that angioblastic meningiomas sometimes bear a striking resemblance to hemangioblastomas. And in this case there is some ground for thinking that the tumor was a meningeal growth.

The case of Rochat is peculiar in that the patient belonged to a family some members of which were afflicted with unmistakable von Hippel-Lindau disease: retinal and cerebellar angiomatosis in one brother; retinal, cerebellar and spinal angiomatosis in another; bilateral retinal angiomatosis in a nephew. The patient had shown temperamental changes at the age of 10 and later began to suffer from generalised epileptic fits with turning of the head to the right. On admission the most relevant findings were:

- right hemiparesis with hyperreflexia, right homonymous hemianopia and bilateral papilledema.
- A brain tumor was diagnosed but not found at operation. The patient later became blind because of optic atrophy.
- Motor impairment worsened and paraphasias of motor type appeared. He died at the age of 31 (11 years after operation). Necropsy revealed no retinal angiomatosis, not even at microscopical examination, but a huge tumor occupying the basal half of the left hemisphere and a left cerebellar cyst with three mural nodules. All the growths had the same microscopical structure. There were large fields of tightly-packed capillaries with large endothelial cells and narrow lumen. Other fields were of looser structure and with large cavities. Between these cavities there were bridges of fibrillar tissue over which passed capillaries with thick hyaline walls. At some points rarefaction of the tissue had led to
cystic formation. There were many pseudo-xanthomatous cells with large irregular nuclei, which stained dark with hematoxylin. Although this case is not supported by microphotographs, the diagnosis seems acceptable for two different reasons. Firstly, the description was quite clear and pointed out histological characteristics that commonly are considered peculiar to hemangioblastomas. Secondly, there is the identity of structure of the cerebral growth and of the cerebellar nodules found in this man, three members of whose family were suffering from angiomatosis of the retina and/or central nervous system.

The case of Keller reported a girl aged 19 with a 1-year history of headache before admission. Later on her personality changed and vision failed. Papilledema and palsy of the left abducens were found at examination. The patient, who had some jacksonian fits while in hospital, died some days after a suboccipital decompression. An egg-sized cyst was found in the frontal lobe at necropsy. It was lined by a thin vascularised membrane containing some reddish-grey, more or less defined nodules of different sizes (from a grain of rice to a plum stone). Microscopically the tumor was described as being rich in capillaries and cavernous vessels and as consisting of two different types of cells: one with light and the other with dark nuclei. Both types had giant and multinucleated forms and almost every cell was laden with lipid droplets. The cells with the light nuclei had little protoplasm and the nuclei, for the most part central, were large and roundish or oval, poor in chromat in and often contained nucleoli. The boundaries of the protoplasm were often undefined. Where the tissue was richer in vessels than in cells a protoplasmic substance clearly was recognisable and had defined boundaries, while the branchings were related reciprocally, so that the picture was of a reticular syncytium. The dark-type cells, which had well-defined cytoplasm and oval or elongated nuclei, were grouped in clusters or in broad bands around short vessels. In our opinion this description is not at all convincing and neither are the microphotographs, which display widespread cellular polymorphism with giant or hyperchromatic nuclei, suggesting a malignant or anaplastic glioma.

Fasiani and Belloni reported the case of a boy aged 14 who, after a 1-year history of right jacksonian fits, eventually showed signs of intracranial hypertension. Severe right hemiparesis, astereognosis of the right hand, visual impairment and bilateral papilledema were the principal signs on admission. Operation was performed after ventriculography and a solid tangerine-sized tumor, unconnected with the meninges, lying between two large cysts in the left central region and filled with yellowish fluid, was removed completely. The tumor appeared to contain many blood vessels, some with muscular connective walls but most with only an endothelial lining. The intervening tissue was described as consisting of cells with round or elongated nuclei, loosely interspersed in an amorphous, vacuolised, eosinophilic substance. The authors themselves stated that the cells stained by the metallic techniques used for glial tissue and that they resembled bipolar spongioblasts. Moreover, among the cells there were many granules, probably of an albuminoid substance. All these features militate against the diagnosis of cerebral hemangioblastoma.

In 1936 Mariotti reported a tumor, found incidentally at necropsy, in the posterior part of the corpus callosum and diagnosed as a hemangioblastoma. The tumor, solid and large as a pigeon’s egg, consisted of a richly vascular net with large lacunae and fine capillaries. Interposed between the vessels were large cells with clear cytoplasm and large, oval, chromatin-poor nuclei, but the predominant components were large, swollen cells with foamy cytoplasm and small, deeply stained nuclei. Giant cells with single or multiple nuclei also were found. There was a fine mesh of reticular fibers, which stained by Foot’s method, throughout the growth. These histological features, though not supported by good microphotographs, would seem to warrant acceptance of the author’s diagnosis.
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The case of Kautzky and Vierdt\textsuperscript{10} is a peculiar example of multiple angiomatosis of the central nervous system. The patient was operated on for right cerebellar hemangioblastoma, which was removed completely. Five years later he had signs of a lesion in the right cerebral hemisphere. Arteriography disclosed a highly vascular tumor lying around the internal carotid bifurcation. It was thought to be inoperable and the patient died shortly after. At necropsy two neoplastic nodules were found in the medulla and a much larger growth in the right cerebral hemisphere. The latter occupied the region of the thalamus and globus pallidus, reached the basal surface of the brain but had no connexion with the meninges. It surrounded the right optic nerve, the chiasma, the right optic tract and the carotid bifurcation. The three growths had identical structure consisting partly of vascular, cavernous lacunae but chiefly of capillaries of different sizes, the walls of which were peppered with "Zwischenzellen." In places the cells, vesicular and of greater size, overshadowed the capillaries. Silver stains (Tibor Pap's method) emphasised the fine vascular structure. These histological features clinch the diagnosis despite the scanty microphotographic documentation.

The first case reported by Floris \textit{et al.}\textsuperscript{5} in their paper of 1954 also should, we feel, be accepted. The patient, a man aged 32, had a 14-month history of jacksonian fits involving the right arm and later headache and finally blurred vision. Incomplete right facial paresis, severe visual impairment and papilledema were the outstanding signs found at examination. A faintly contrasted frontal mass was visible at left carotidography. A tangerine-sized, richly vascularised and well-defined tumor in the left frontal lobe was removed at operation. It consisted of a thick network of capillaries with only an endothelial lining, sometimes dilating into large lacunae. Between the vessels there were cells, in places packed into sheets, with elongated nuclei and clear cytoplasm, laden here and there with lipid droplets (xanthomatous cells). The microphotographs, which bear out the description, support the diagnosis of hemangioblastoma.

Another convincing case is the fifth case reported by Grattarola\textsuperscript{9} in his paper of 1955. The patient was a youth of 18 with a 4-month history of headache, vomiting and finally diplopia and visual impairment. The findings at examination were: bilateral papilledema with severe visual impairment, right homonymous hemianopia and hyposthesia in the area supplied by the 1st and 2nd right trigeminal branches. Right carotidography stained a roundish mass in the right temporal lobe and a cyst was found in that site at operation. A nodule located in its wall was removed. It consisted of sinusoids and capillaries and there were also vascular buds protruding into the intervacular tissue. The elements of this were polyhedral or elongated cells, often packed into bands, with scanty cytoplasm and large, poorly staining nuclei and evident nucleoli. Some cells were swollen and, with fat-staining methods, they appeared to be laden with lipid droplets. No glial cells stained with metallic techniques. These features support the diagnosis of hemangioblastoma, which is confirmed by the microphotographs, although these are not of good quality.

Other cases of cerebral hemangioblastoma are referred to in the literature, but unfortunately few of them are documented by microphotographs or histological descriptions and so little information is given that no new clinical knowledge emerges therefrom. For instance, Grant reported that of the 64 cases of hemangioma operated on at the Hospital of the University of Pennsylvania 22 were located above the tentorium, but he added nothing more to this bare statement. Stein \textit{et al.}\textsuperscript{18} quite recently reported 19 cases of infratentorial and 2 cases of supratentorial hemangioblastomas but gave very little information on the latter. Two microphotographs of a solid growth removed from the left temporal lobe of a 49-year-old man make the first of these cases acceptable, but no clinical information is given except that the symptoms had begun only 3 weeks before operation. Of the second
case, that of a cystic tumor with multiple mural nodules in the right frontal lobe, it is reported only that the patient, a 12-year-old girl, had had a 4.5-month history before operation. No microphotographs were given.

In 1961 Papo et al.,

14 in a paper dealing chiefly with cerebellar hemangioblastomas, referred briefly to a tumor of this kind located in the left frontal lobe. No clinical information was given but it was reported that carotidography revealed a space-occupying lesion stained by the contrast medium. A deep reddish growth was removed completely at operation. A 7-year follow-up confirmed the success of the operation. The case was illustrated by a microphotograph, which is convincing.

To sum up, we consider that, in addition to our 2 cases, there are 7 other histologically proven cases: those of Rochat,

15 Kautzky and Vierdt,

10 Floris et al.,

8 Grattarola,

9 Mariotti,

18 the second case of Stein et al.,

18 and the case of Papo et al.

14 But as the last 3 cases are described too succinctly they will not be considered in the following remarks dealing with the clinical and radiological features (Table 1).

Clinical Features

The age range in the 6 cases described in detail was from 10 to 55 years and all the patients were male. The sites of the tumors were as follows: right basal ganglia (1); basal half of left cerebral hemisphere (1); left frontal lobe (1); right frontal lobe (1); left temporoparietal region (1) and right parieto-occipital region (1). In the 4 cases in which the tumor was removed surgically the preoperative history ranged from 1 month to 10 years. In the case with the shortest history the symptoms appeared suddenly as the result of a juxtatumoral hemorrhage. In the patient with the longest history the first focal symptoms, visual fits, caused the patient little trouble or were interpreted incorrectly so that with the evidently slow growth of the tumor a lot of time passed before it gave rise to symptoms that made the patient seek medical advice. In 1 of the 2 patients not subjected to surgery some months elapsed between the initial complaints and the time of death. The second patient died 11 years after the onset of symptoms. Papilledema was common to all patients. Other signs varied according to the site of the tumor but it is curious, to say the least, that in 5 of the 6 cases there was homonymous hemianopia from a lesion of the optical pathways more or less distant from the visual cortex. In no case was there polycythemia or at least this was not mentioned.

Radiological Features

According to Lindgren,

12 cerebellar hemangioblastomas may produce one of two angiographic appearances. In the first there is a well-defined vascularised nodule projecting into the cyst. In some cases it stains homogeneously but more often it consists of a thick mesh of fine, relatively regular, vessels. The size of the cyst may be estimated from the displacement of the surrounding normal vessels. In the second angiographic type the whole cyst is vascularised and appears as a roundish, contrasted zone, usually some millimetres wide, around an inner poorly stained area. In these cases the size of the tumor is apparent at once.

Carotidography was performed in 5 patients with cerebral hemangioblastoma and in every case the tumor was made directly visible by the contrast medium. In 2 cases (our Case 1, and Kautzky and Vierdt's
case) the tumor was densely contrasted, whilst in the other 3 the contrast was weaker and more homogeneous, though well-defined and circumscribed just the same. In other words, the angiographic aspect of supratentorial hemangioblastoma is similar to that of infratentorial hemangioblastoma, but in the feebly contrasted cases a halo of opaqueness is not seen around a poorly stained centre.

Operative Results

One patient was not operated on. In another case an exploratory craniotomy was performed but the tumor was not found. The patient withstood the operation, dying 11 years later. The tumor was removed successfully in the other 4 cases and the patients
## TABLE 1

Summary of 6 cases of cerebral hemangioblastoma

<table>
<thead>
<tr>
<th>Author</th>
<th>Sex</th>
<th>Age (Yrs.)</th>
<th>First Symptom</th>
<th>Following Symptoms</th>
<th>Duration of Illness Prior to Op.</th>
<th>Clinical Findings</th>
<th>Radiological Findings</th>
<th>Surgical Treatment and Findings</th>
<th>Result</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rochat*</td>
<td>M</td>
<td>29</td>
<td>Change in mood</td>
<td>Generalized epileptic fits</td>
<td>Some mos.</td>
<td>R. hemiparesis, r. homon, hemianopia, bilateral papilledema</td>
<td>No rad. exam. performed</td>
<td>Exploratory craniotomy: no tumor found</td>
<td>Death 11 yrs. after onset of symptoms</td>
<td>Huge solid tumor occupying lower half of l. cerebellum; cyst in l. cerebellum hemisphene with 3 mural hemangioblastomas. Some members of family suffering from von Hippel’s dia.</td>
</tr>
<tr>
<td>Kautzky &amp; Vierdt**</td>
<td>M</td>
<td>55</td>
<td>Headache</td>
<td>Visual disturbances</td>
<td>Some mos.</td>
<td>L. hemianopia, mild l. facial paresis, r. pupil larger than l.</td>
<td>R. carotidography: egg-sized, very vascular tumor surrounding but not displacing carotid bifurcation</td>
<td>Not treated as thought to be inoperable</td>
<td>Death some mos. after onset of sympotms</td>
<td>Reddish solid egg-sized tumor occupying region of r. globus pallidus and thalamus; 2 other cherry-sized tumors of same kind in medulla. Patient had op. 5 yrs. before for total removal of r. cerebellum hemangioblastoma</td>
</tr>
<tr>
<td>Floris et al.*</td>
<td>M</td>
<td>34</td>
<td>L. brachial jacksonian fit</td>
<td>Headache, visual disturbances</td>
<td>14 mos.</td>
<td>R. facial paresis, visual impairment, papilledema</td>
<td>L. carotidography: branches of anterior cerebral artery displaced by mass faintly opacified in late arterial and capillary phases</td>
<td>Solid tangerine-sized, deep l. frontal tumor; total removal</td>
<td>Result not given</td>
<td></td>
</tr>
<tr>
<td>Grattarola*</td>
<td>M</td>
<td>18</td>
<td>Headache, vomiting</td>
<td>Diplopia, visual impairment, pain and paresthesias in area of 1st and 2nd r. trigeminal branches</td>
<td>4 mos.</td>
<td>Papilledema, severe visual impairment, r. homonymous hemianopia; hypotension in 1st and 2nd r. trigeminal branch area</td>
<td>R. carotidography: middle cerebral artery hypertrophic and displaced upward by roundish mass feebly opacified in arterial and early venous phases</td>
<td>Cherry-sized mural nodule in a cyst of r. temporal lobe; total removal</td>
<td>Cure with severe residual visual impairment</td>
<td></td>
</tr>
<tr>
<td>Morello &amp; Bianchi Case 1</td>
<td>M</td>
<td>19</td>
<td>Sudden frontal headache, vomiting, coma for some hrs., r. hemiparesis and l. ophthalmoplegia, bloody CSF</td>
<td>Ophthalmoplegia and hemiparesis partially cleared up</td>
<td>1 mo.</td>
<td>L. incomplete ophthalmoplegia, r. hemiparesis, r. homonymous hemianopia, bilateral blurring of optic discs</td>
<td>L. carotidography: small-richly vascularized nodule in posterior temporal region</td>
<td>Tangerine-sized intracerebral tempo-occipital hemangiofibroma; pea-sized mural nodule; total removal</td>
<td>Cure with residual r. homonymous inferior quadrantanopia</td>
<td></td>
</tr>
<tr>
<td>Morello &amp; Bianchi Case 2</td>
<td>M</td>
<td>47</td>
<td>Visual epileptic seizures</td>
<td>Headache, visual impairment</td>
<td>10 yrs.</td>
<td>Mild l. hemiparesis, l. homonymous hemianopia, bilateral papilledema</td>
<td>R. carotidography: vascularized mural nodule in parieto-occipital region</td>
<td>R. parieto-occipital, apicoc-torial, solid circumscripted tumor; total remov</td>
<td>Cure with residual severe visual impairment</td>
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were cured definitely, despite disabling sequelae of varying degree according to the extent of previous neurological damage or to long-standing intracranial hypertension. The case of Papo et al.,14 also was successful. It therefore would seem that the postoperative prognosis of cerebral hemangioblastoma is good.

**Summary**

The literature on cerebral hemangioblastomas is reviewed and 2 personal cases are reported. From the available cases in which carotidography was performed it appears that the angiographic appearance of these tumors is very similar to that of cerebellar hemangioblastomas and hence angiography may permit preoperative diagnosis.

**References**

4. Borchi. Cited by Zülch.20