Angioblastic Meningiomas
Clinicopathologic Study of 81 Cases*

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Of the primary meningeal neoplasms, angioblastic meningiomas are often
the most difficult to diagnose and classify. The difficulty arises from the wide
variation not only in their histological patterns but in their nosology. Such tumors
differ in their histological appearance from the usual meningioma in that they lack cells re-
sembling arachnoidal cap cells and have a variety of vascular components that mimic
other tumors both in and outside the neu-

raxis. Some examples are indistinguishable
from the hemangioblastoma of the cerebel-

lum,3,17 while others are identical to the
hemangiopericytoma,12,17,20 a tumor usually
found in the soft tissues. These tumors were
first elegantly portrayed and classified as an-

gioblastic meningiomas by Cushing and Ei-

senhardt.8 In addition, transitional forms
were depicted that linked these lesions to
more typical meningiomas. The precedence
and accuracy of this and other reports form
the basis of current concepts of these tu-
mors. Over the years these tumors have been
regarded as more aggressive neoplasms than
other meningiomas, yet the limited statistical
data regarding their biological behavior and
the recent distinction of hemangiopericy-
tomas suggested that restudy of this group of
unusual neoplasms was warranted.

To clarify the diagnostic criteria and de-
termine the biological behavior of these tu-
mors, a review of the angioblastic menin-
giomas was undertaken. This report gives
our experience with the major pathological
and demographic features of the 81 well-
documented examples available for study
from over 1900 meningiomas coded in the
Armed Forces Institute of Pathology (AFIP) files.

**Material and Methods**

Of the 116 tumors coded by earlier re-
viewers as "angioblastic meningiomas" from
the total 1900 meningiomas in the AFIP
files, 81 were well documented and suffi-
ciently characteristic to be analyzed. The
surgical and autopsy material from these
cases had been received from military, civil-
ian, and Veterans Administration treatment
facilities. Follow-up data on the surviving
patients and clinical summaries were ob-
tained and abstracted for the statistical anal-
yses.

Since the nosologic categorization of these
tumors remains controversial, particularly
with respect to the hemangiopericytomas, we
chose to follow the criteria of Cushing and Ei-
senhardt.8 Their report not only takes
precedence but still accurately portrays the
morphological features of these neoplasms.
Following their precepts, all tumors were ex-
amined and classified independently by two
of us (D.T.P. and J.M.H.) as either Type
IV Variant 3 (hemangioblastic) or Type IV
Variant 1 (hemangiopericytic) of angioblas-
tic meningioma. The transitional (Type IV
Variant 2), controversial, and unclassifiable
neoplasms and cerebellar hemangioblas-
tomas were excluded.

Hematoxylin and eosin-stained sections
were studied on all cases, and additional sec-
tions were prepared on many by staining for
reticulin, elastic, and collagen fibers.
TABLE 1
Age of patients at detection of tumor

<table>
<thead>
<tr>
<th>Age Group (yrs)</th>
<th>Hemangio-</th>
<th>Hemangio-</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>blastic Variant (no.)</td>
<td>pericytic Variant (no.)</td>
</tr>
<tr>
<td>0-9</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>10-19</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>20-29</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>30-39</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>40-49</td>
<td>12</td>
<td>10</td>
</tr>
<tr>
<td>50-59</td>
<td>9</td>
<td>7</td>
</tr>
<tr>
<td>60-69</td>
<td>4</td>
<td>1</td>
</tr>
<tr>
<td>70 and over</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Total cases</td>
<td>42</td>
<td>37</td>
</tr>
<tr>
<td>Median age</td>
<td>47 yrs</td>
<td>40 yrs</td>
</tr>
</tbody>
</table>

Results

Our review of the 116 tumors coded by earlier reviewers as angioblastic meningiomas revealed 42 hemangioblastic, 39 hemangiopericytic, and 35 transitional types. Since we could not consistently differentiate the transitional variants from other meningiomas histologically, this group was excluded from the remainder of the study.

The hemangioblastic and hemangiopericytic types were sufficiently characteristic to be readily distinguished microscopically. On that basis the cases were subgrouped, analyzed, and compared. The salient clinicopathological features of these two groups are presented in Tables 1–4. The tumors occurred most often in males, but this fact probably reflects the preponderance of males among the military population studied. The hemangiopericytic group became symptomatic at a median age of 40 years as compared to 47 years for the hemangioblastic group (Table 1).

The clinical symptoms and neurological findings in both groups corresponded closely to the location and size of the tumor. Neither group presented features that would distinguish them preoperatively from other meningiomas. The duration of symptoms was significantly shorter in hemangiopericytic tumors (Table 2). This information, as well as the earlier age at time of detection, suggested a more rapid growth of the hemangiopericytic group in the preoperative period.

Eight hemangioblastic tumors had not received treatment, including three that were found incidentally at autopsy. Three were treated by both surgical excision and radiation therapy. Four hemangiopericytic tumors were treated by combined surgical excision and radiation therapy, and one received radiation only. The remainder of the tumors in both groups were treated surgically. When the two groups were compared by the last known status of patients, it was found that significantly more patients with hemangiopericytic tumors had recurrence than those with the hemangioblastic type ($p = 12.834$). It was also found that significantly more patients with the hemangiopericytic variety had died of recurrent or metastatic tumor ($p = 8.125$) than the hemangioblastic group (Table 4). Four of the hemangiopericytic type had distant metastases, and all had been operated on one or more times. Metastases involved lung, liver, kidneys, pancreas, and the adrenal gland.

Except for the three peritocular hemangiopericytic tumors, the distribution pattern of the tumors paralleled that of meningiomas in general (Table 3). One of the five patients with hemangioblastic tumors of the spinal canal had two separate tumors. The first was removed from the lower thoracic spine in 1957, and a completely separate tumor was removed from the midcervical spine 7 years later. Of the tumors studied, there was no