Papillary craniopharyngioma: a clinicopathological study of 48 cases

THOMAS B. CROTTY, M.D., BERND W. SCHEITHAUER, M.D., WILLIAM F. YOUNG, JR., M.D., DUDLEY H. DAVIS, M.D., EDWARD G. SHAW, M.D., GARY M. MILLER, M.D., AND PETER C. BURGER, M.D.

Divisions of Anatomic Pathology, Endocrinology/Metabolism and Internal Medicine, and Radiation Oncology, and the Departments of Neurologic Surgery and Diagnostic Radiology, Mayo Clinic and Mayo Foundation, Rochester, Minnesota; and the Department of Pathology, The Johns Hopkins Hospital, Baltimore, Maryland

Two distinct clinicopathological variants of craniopharyngioma exist: the classic adamantinomatous type and a recently described papillary form that predominates in adults and reportedly behaves in a less aggressive manner. The present study describes the clinicopathological features of 48 patients with papillary craniopharyngioma treated at the Mayo Clinic between 1910 and 1994. An additional four tumors were found to have histological features of both adamantinomatous and papillary craniopharyngioma. Whereas adamantinomatous tumors typically occur in adolescent patients, the mean age of the 48 patients (23 males and 25 females) with papillary craniopharyngioma was 44.7 years (range 10 to 74 years). Presenting clinical features included visual impairment (84%), headache (68%), and pituitary insufficiency (anterior 42%; posterior 27%). Preoperative computerized tomography (CT) and magnetic resonance (MR) imaging in 17 patients typically revealed a noncalcified, partially cystic mass that enhanced peripherally and contained mural nodules (67%). Many (41%) of the lesions involved or extended into the third ventricle on imaging. At first surgery, gross total tumor removal was achieved in 17 patients (36%) and subtotal resection in 30 patients (64%) in whom tumor resection was attempted. Tumor recurrence was noted in two patients who underwent gross total removal. Tumor-free survival rates of 100% and 78% were obtained in patients who underwent gross total and subtotal resection at initial surgery, respectively. Postoperative radiation therapy was beneficial to patients having undergone a subtotal resection, with an increase in tumor-free survival from 26% to 86%.

Aside from well-documented morphological distinctions, papillary craniopharyngiomas differ from adamantinomatous tumors in several important respects. These include the almost exclusive occurrence of papillary tumors in adulthood and their more uniform appearance on both CT and MR imaging. However, a preliminary analysis of our data suggests there are no significant differences between the two lesions with respect to resectability, efficacy of radiation therapy, and overall survival.

KEY WORDS • craniopharyngioma • morphological study • endocrinology • prognosis • third ventricle

CRANIOPHARYNGIOMAS are uncommon tumors with distinctive histological features and a pronounced tendency to invade locally and to recur following therapy.5,14,16 Two variants of craniopharyngioma, with differing clinical and morphological features, have been described. The adamantinomatous craniopharyngioma is composed of a complex mixture of adamantinoma-like epithelium, “wet” keratin, microcalcifications, necrotic debris, fibrosis, and micro- or macrocysts. In contrast, papillary craniopharyngiomas form papillae composed of mature squamous epithelium and are unaccompanied by fibrocalcific and degenerative changes.8 Whereas adamantinomatous tumors occur at all ages, predominating during childhood and early adolescence, papillary craniopharyngiomas have been reported only in adults. Furthermore, the papillary forms are reportedly less prone to recurrence.1

Few reports of papillary craniopharyngioma have been published; of these, all but one are based on small numbers of cases. A detailed account of the clinical, endocrinological, radiographic, and operative features of papillary craniopharyngioma; its response to therapy; and the morphological features that distinguish it from other cystic suprasellar lesions has not been published. To address these issues, we describe the Mayo Clinic’s experience with 48 patients having papillary craniopharyngioma.

Clinical Material and Methods

The Mayo Clinic Tissue Registry files dating from 1910 to 1994 were reviewed as were microsections of all tumors surgically resected from the sellar region (other than pituitary adenomas). A diagnosis of papillary craniopharyngioma was made when the epithelial component of
Papillary craniopharyngioma

the tumor consisted entirely of mature squamous epithelium that focally or throughout exhibited a papillary architecture. Excluded from the study were tumors in which the squamous epithelium lacked papillations or was associated with the formation of flaky keratin (epidermoid cyst).

Five-micron-thick sections of formalin-fixed, paraffin-embedded surgical specimens were stained by the hematoxylin and eosin and mucicarmine methods. Tumors in which rare goblet or ciliated cells were noted (features suggesting a relation to Rathke’s cleft epithelium) were immunohistochemically stained with polyclonal antisera directed toward prolactin (dilution 1:1200), adrenocorticotropic hormone (ACTH) (dilution 1:1600), and the α subunit of follicle-stimulating hormone (α-FSH) (dilution 1:400) (all donated by the National Hormone and Pituitary Agency (NIDDK), University of Maryland School of Medicine, Baltimore, MD). In addition, antisera to cytokeratin (AE1/AE3) (Boehringer Mannheim Corporation/Biochemical Products, Indianapolis, IN; 1:75) and epithelial membrane antigen (Dako Corporation, Carpenteria, CA; 1:50) were also applied to selected tumors. A modification of the avidin–biotin–peroxidase complex technique was employed.

Ultrastructural analysis was undertaken in seven cases; specimens had been primarily fixed in Trump’s solution and routinely processed.

Clinical, endocrinological, radiographic, surgical, and radiotherapeutic data were acquired by review of medical records and radiographs. In some instances, additional information was obtained from referring physicians. Tumor regrowth was defined as a histologically confirmed, enlarging tumor in a patient known to have undergone incomplete resection; tumor recurrence was defined as histologically confirmed tumor growth in patients having undergone gross total resection.

Results

The 48 cases examined represented 20% of all craniopharyngiomas diagnosed at the Mayo Clinic during the study period. Males (23 patients) and females (25 patients) were almost equally represented. Patient ages ranged from 10 to 74 years (mean 44.7 years). Aside from one 10-year-old boy, all patients with papillary tumors were 20 years of age or older at the time of diagnosis.

Figure 1 illustrates the age distributions of patients with adamantinomatous and papillary craniopharyngioma.

In an additional four cases (three men and one woman, aged 24 to 58 years), the tumors exhibited combined histological features of both adamantinomatous and papillary craniopharyngioma.

Pathological Findings

On the basis of operative reports and histological data, we found most tumors to be composed of both solid and cystic components. In a minority of cases the tumors were either entirely solid or entirely cystic in nature. Cyst contents were typically described as viscous and yellow. In mixed solid and cystic tumors, the solid component typically consisted of a small (often less than 1 cm), yellow–green mural nodule (Fig. 2). Most tumors were suprasellar in location (see Radiographic Features below).

Histologically, the papillary architecture of the tumor and the mature squamous differentiation of its epithelium were readily identifiable in most cases (Fig. 3). Distinctive peripheral palisading of cells, loose-knit “stellate reticulum,” and microcystic degeneration—all characteristics of adamantinomatous tumors—were absent. Small aggregates of keratinized cells were present in some tumors, but flaky keratin, a feature of epidermoid cyst, and the nodules of “wet” keratin typical of adamantinomatous lesions were not seen. Infiltration of adjacent brain tissue by neoplastic epithelium was not identified in any papillary tumor.

The epithelial lining of cystic tumors was often focally attenuated and lacking in papillae. Though such regions somewhat resembled the lining of an epidermoid cyst, the presence of papillations in other portions of the specimen as well as the lack of flaky keratinous debris permitted a diagnosis of papillary craniopharyngioma.

Goblet cells similar to those seen in Rathke’s cleft cyst were present in 16 tumors (33%), disposed either singly or in small groups within the squamous epithelium (Fig. 4 left). Rare ciliated cells were identified in two tumors (4%) (Fig. 4 right). Cytokeratin and epithelial membrane
antigen stains were strongly positive in all epithelial cells. Immunohistochemical staining for prolactin, ACTH, and α-FSH was negative.

The stroma underlying the squamous epithelium typically contained a small number of chronic inflammatory cells, including lymphocytes, plasma cells, and, in some instances, small aggregates of foamy histiocytes. Occasionally, the stromal collagen formed hypocellular, markedly hyalinized nodules, which at low power superficially resembled the nodules of “wet” keratin characteristic of adamantinomatous craniopharyngioma (Fig. 5). Cholesterol accumulation, necrosis, and fibrosis were minimal or absent. Rare microcalcifications were present in two tumors; these were located within the epithelium in one case and the stroma in the other.

Ultrastructural examination of seven papillary tumors revealed epithelial cells with abundant cytoplasm containing bundles of tonofilaments. Surface specializations included numerous prominent microvilli in addition to well-formed desmosomes.

In addition to the 48 typical papillary craniopharyngiomas, four additional tumors manifested histological features of both adamantinomatous and papillary craniopharyngioma. In three of these cases, there were alternating areas of clearly defined adamantinomatous and papillary squamous differentiation within the same tumor; in

Fig. 3. Photomicrographs displaying papillary and adamantinomatous variants of craniopharyngioma. The papillary craniopharyngioma (left) is composed of mature squamous epithelium forming crude papillations, resulting from dehiscence (asterisks) of squamous epithelial cells. This tumor lacks the peripheral palisading of cells, loose-knit “stellate reticulum,” microcalcifications, keratinous nodules, and microcystic degeneration that typify the adamantinomatous tumor (right). H & E, original magnification × 125.

Fig. 4. Photomicrographs of papillary craniopharyngioma. Mucinous (left) and ciliated (right) cells were occasionally identified in papillary craniopharyngioma. The presence of these features in a small or nonrepresentative biopsy specimen may lead to a misdiagnosis of Rathke’s cleft cyst. Left: Mucicarmine, original magnification × 400. Right: H & E, original magnification × 400.
the fourth case, the epithelium was intermediate in appearance.

Clinical Features

Signs and symptoms at presentation were related to sellar and suprasellar mass effect. Visual loss, headache, and fatigue were the most frequent (Table 1). Partial or complete anterior pituitary insufficiency was observed in 13 patients (27%). Serum prolactin concentrations were increased (mean 46.5 ± 22 ng/ml; normal < 23 ng/ml) in 14 (93%) of 15 patients. Postoperatively, visual field defects improved in 71%, remained stable in 13%, and became worse in 16% of patients. The findings of anterior and posterior pituitary insufficiency (diabetes insipidus) increased after surgery to 84% and 62% of patients, respectively. Pituitary–target gland axis function was not restored after surgery in any patient. Increase in appetite was common: 21 patients (44%) gained more than 5 kg in body weight during the first 3 years after surgery (mean 22.1 ± 17.1 kg; range 5 to 69 kg).

Radiographic Features

Preoperative cross-sectional imaging studies were available for review in 17 patients; these included computerized tomography (CT) in 17 patients and magnetic resonance (MR) imaging in five patients (Table 2). In the remaining 31 patients, either the cross-sectional studies had been purged from our files or the patients had been evaluated in the pre–CT era.

On CT, the tumors were primarily suprasellar in location, with seven of the lesions extending into the third ventricle. Extension into the sella was observed in two patients and extension into the basal ganglia in two. The neoplasms ranged in size from 2 to 4 cm (mean 2.6 cm). Nine lesions contained mixed cystic and solid components, six looked predominantly solid, and two were nearly completely cystic. Contrast enhancement was used in 15 cases. Thin, peripheral rim enhancement with enhancing mural nodules was the most common pattern (67%) (Fig. 6). Less commonly, solid or large nodular enhancement patterns were observed. Two of the lesions contained septations. Calcification was not observed in any case. Follow-up studies were available in two cases, with the follow-up examinations being obtained at 2 months and 7 months after the initial study, respectively. In both instances, the tumors were larger and more cystic and had developed septations (Fig. 7).

In the five patients with preoperative MR imaging studies, the appearance and enhancement patterns were similar to those noted on CT. However, the MR method more accurately depicted the location and extension of the craniopharyngioma. In one instance, a cystic component was better seen with MR imaging, and in another case this

<table>
<thead>
<tr>
<th>TABLE 1</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sign or Symptom</strong></td>
</tr>
<tr>
<td>loss of vision</td>
</tr>
<tr>
<td>headaches</td>
</tr>
<tr>
<td>fatigue</td>
</tr>
<tr>
<td>impotence*</td>
</tr>
<tr>
<td>polyuria and polydipsia</td>
</tr>
<tr>
<td>changes in mentation</td>
</tr>
<tr>
<td>galactorrhea*</td>
</tr>
</tbody>
</table>

* Frequency of impotence and galactorrhea are shown for men and women, respectively.

<table>
<thead>
<tr>
<th>TABLE 2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Feature</strong></td>
</tr>
<tr>
<td>primary location</td>
</tr>
<tr>
<td>suprasella</td>
</tr>
<tr>
<td>third ventricle</td>
</tr>
<tr>
<td>sella</td>
</tr>
<tr>
<td>basal ganglia</td>
</tr>
<tr>
<td>solid</td>
</tr>
<tr>
<td>cystic</td>
</tr>
<tr>
<td>solid &amp; cystic</td>
</tr>
<tr>
<td>contrast enhancement*</td>
</tr>
<tr>
<td>rim enhancement with mural nodules</td>
</tr>
<tr>
<td>solid</td>
</tr>
<tr>
<td>calcification</td>
</tr>
<tr>
<td>low T1 signal?</td>
</tr>
<tr>
<td>hyperintense T1 signal?</td>
</tr>
</tbody>
</table>

* Available in 15 cases. † Relative to gray matter. Magnetic resonance imaging was available for review in five cases.
method correctly identified an intraventricular location (Fig. 8). All lesions had predominantly low signals on T₁-weighted studies and were hyperintense on T₂-weighted sequences.

Operative Approaches

Forty-two of the 48 patients (88%) were initially treated by craniotomy and tumor resection. Among the remaining six patients, transphenoidal resection was used in five cases and stereotactic biopsy (followed by radiation therapy) in one. Of the 47 patients in whom tumor resection was attempted, 17 (36%) underwent gross total tumor removal, two of them by transphenoidal resections; in the remaining 30 (64%), only subtotal resection was achieved.

Nineteen patients underwent more than one operation for excision of residual or recurrent tumor (22 operations) or for reaccumulation of cyst fluid (five operations). These included five patients who each underwent a total of three operations and one patient who had five operations. Of the 22 operations for residual or recurrent tumor, a gross total resection was described in eight cases (36%).

Of the 25 operations for primary and recurrent tumors in which gross total removal of tumor was described, a relatively good plane between tumor and surrounding structures was noted in 20 (80%). In contrast, a good plane of cleavage was described in only two of the 32 operations (6%) in which subtotal removal was achieved.

Radiation Therapy

Twenty-three patients received postoperative radiation therapy: 10 after surgery at first presentation and 13 after tumor progression. The former group included one patient who had a total removal and nine patients with subtotal removal (one of whom underwent stereotactic biopsy only); the latter included two patients with total removal and 11 patients with subtotal removal. Twenty-two patients had external beam radiotherapy and one underwent instillation of intracystic phosphorus-32. Of the group of 22, seven had orthovoltage (200 to 250 kV), three had cobalt-60, and 12 had megavoltage (4 to 18 MeV) treatment. The total dose, calculated at the midplane for opposed fields or intersection of field centers for nonopposed fields, ranged from 340 to 6390 cGy (median 4500 cGy). The median dose per fraction, number of fractions, and total treatment days were 180 cGy, 25, and 38 days, respectively. All received localized radiation treatment, with opposed lateral, anterior plus opposed lateral, or vertex plus opposed lateral fields. The median maximum treatment field diameter was 6.5 cm (range 5 to 8 cm).

Patients With Gross Total Resection. Of the 17 patients in whom a gross total resection was described at first surgery, one died in the perioperative period of an intra-
 Patients With Subtotal Resection. Of the 47 patients in whom tumor resection was attempted, incomplete tumor excision was achieved in 30 (64%). Of these, eight patients received postoperative radiotherapy; five remained tumor free after 3 to 17 years (mean 10 years), one is symptomatically well with a small residual tumor 10 years later, one underwent a second attempt at resection but died of tumor 7 months after diagnosis, and one was lost to follow up. Overall, six of seven (86%) adequately followed patients who had incomplete excision and received postoperative radiation therapy were free of tumor progression (Table 3).

Twenty-two patients whose tumors had been incompletely excised at first operation were not initially treated with radiation therapy. Of these, one patient died postoperatively (no autopsy was performed) and two patients were lost to follow up in the perioperative period. One patient died of disease 8 months after initial surgery without undergoing further therapeutic intervention, and one patient underwent a second operation for tumor removal but died of disease 1.5 years later. Three patients were alive without evidence of disease 3, 8, and 11 years after surgery without having undergone further therapy, one patient had radiographic evidence of a small amount of nonprogressive residual tumor 8 years after initial surgery, and one patient died of an unrelated illness 20 years after diagnosis without having experienced tumor recurrence. Eleven patients, including one patient who received phosphorus-32, underwent both surgical intervention and radiation therapy for tumor regrowth. Of these, six were alive without evidence of disease after 1 to 30 years (mean 17 years), two had residual tumor after 0.5 and 2 years, and three were lost to follow up after 2, 8, and 11 years. One patient who was treated with surgery alone for subsequent tumor regrowth was alive with residual tumor 12 years after diagnosis. Overall, 12 of 16 (75%) adequately followed patients whose initial treatment was limited to incomplete excision only were free of tumor progression.

The one patient in whom surgical resection was not attempted, and in whom treatment consisted of radiotherapy after a stereotactic biopsy diagnosis of papillary craniopharyngioma, died from an unrelated illness 3 years after diagnosis without clinical or radiographic evidence of residual tumor.

Overall, local control (that is, freedom from tumor progression) with radiation therapy was seen in 16 of 19 (84%) patients (with three patients lost to follow up excluded). None of the eight patients who had received more than 5000 cGy experienced tumor progression.

The one patient in whom surgical resection was not attempted, and in whom treatment consisted of radiotherapy after a stereotactic biopsy diagnosis of papillary craniopharyngioma, died from an unrelated illness 3 years after diagnosis without clinical or radiographic evidence of residual tumor.

Overall, local control (that is, freedom from tumor progression) with radiation therapy was seen in 16 of 19 (84%) patients (with three patients lost to follow up excluded). None of the eight patients who had received more than 5000 cGy experienced tumor progression.

### TABLE 3

**Patient outcome by treatment (Tx) type**

<table>
<thead>
<tr>
<th>Extent of Removal†</th>
<th>Tumor Free After 1st Tx (%)</th>
<th>Tumor Free After 1st Tx &amp; Salvage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>gross total resection radiation therapy</td>
<td>1 of 1 (100)‡</td>
<td>1 of 1 (100)‡</td>
</tr>
<tr>
<td>no radiation therapy</td>
<td>9 of 11 (82)</td>
<td>12 of 12‡</td>
</tr>
<tr>
<td>subtotal resection radiation therapy</td>
<td>6 of 7 (86)§</td>
<td>6 of 7 (86)</td>
</tr>
<tr>
<td>no radiation therapy</td>
<td>5 of 19 (26)‡</td>
<td>12 of 16 (75)</td>
</tr>
</tbody>
</table>

* Excludes patients who died in the perioperative period or who were lost to follow up with unknown disease status.
† Extent of tumor removal at first surgery.
‡ Includes one patient who has a small amount of radiographically confirmed nonprogressive tumor.
Comparison With Adamantinomatous Craniopharyngioma

The effect of the histological type of tumor on patient survival was analyzed for patients diagnosed after 1975 (Table 4). A detailed analysis of the relative efficacy of radiotherapy for papillary and adamantinomatous tumors was not undertaken, as it is part of a second study currently in preparation. A majority of patients (76%) with adamantinomatous tumors underwent gross total resection of tumor at initial surgery, whereas the proportions of total (53%) and subtotal (47%) resections were approximately equal in the papillary group. When last seen, all patients in both tumor subgroups were alive without clinical or radiographic evidence of progressive tumor, there being no obvious difference in the overall survival of the two groups.

Diagnostic Problems

Two cases are of particular interest because they illustrate possible pitfalls in the diagnosis of papillary craniopharyngioma. One patient, a 22-year-old man, presented with a 2-year history of impaired vision and headaches and underwent transphenoidal resection of a solid and cystic sellar and suprasellar lesion. The initial specimen showed features suggestive of Rathke’s cleft cyst with squamous metaplasia. The lesion recurred 3 months later and a repeat biopsy showed similar histological features. On second recurrence 4 months thereafter, a typical papillary craniopharyngioma was found, one associated with Rathke’s cleft cystlike areas. Another patient, a 36-year-old woman, presented with a cystic sellar lesion that was biopsied and diagnosed as Rathke’s cleft cyst on intraoperative frozen-section examination, based on the presence of numerous goblet cells. Permanent sections disclosed a papillary craniopharyngioma.

Tumors With Intermediate Histological Appearance

Of the four patients whose tumors exhibited adamantinomatous and papillary differentiation, three underwent gross total excision at the first operation. One patient was lost to follow up, and two were alive without recurrence after 7 and 8 years. One patient who had undergone subtotal tumor resection was treated with surgery and radiotherapy 3 months afterwards for tumor regrowth; this patient was alive without evidence of disease 18 years after diagnosis.

Table 4

<table>
<thead>
<tr>
<th>Extent of Removal</th>
<th>Tumor Free After 1st Tx (%)</th>
<th>Tumor Free After 1st Tx &amp; Salvage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Papillary</td>
<td>9 of 10 (90)</td>
<td>10 of 10 (100)</td>
</tr>
<tr>
<td>Adamantinomatous</td>
<td>46 of 54 (85)</td>
<td>50 of 54 (93)</td>
</tr>
<tr>
<td>Subtotal resection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Papillary</td>
<td>5 of 9 (56)</td>
<td>7 of 8 (87)</td>
</tr>
<tr>
<td>Adamantinomatous</td>
<td>14 of 17 (82)</td>
<td>15 of 16 (91)</td>
</tr>
</tbody>
</table>

* Excludes patients who died in the perioperative period or who were lost to follow up with unknown disease status. Tx = treatment.
† Extent of tumor removal at first surgery.
‡ Includes one patient who has a small amount of radiographically confirmed nonprogressive tumor.

Discussion

The findings of our study support the conclusion of others that papillary craniopharyngioma represents a distinct clinicopathological entity.1,8,14 Papillary craniopharyngioma is almost exclusively a tumor of adults, with a mean age in our study of 44 years. In a previous series,1 the average age of 15 patients was 40.8 years. Only two childhood examples of this tumor have been reported: one in the present study and one in the series of Kahn, et al.14 Although in our patient group adamantinomatous tumors were more common in all age groups, previous studies have noted an approximately equal representation of papillary and adamantinomatous tumors in adults.1,24

Clinical Features

In the present series, clinical presentation was dominated by signs and symptoms of “mass effect” (Table 1). Loss of vision was the most common presenting symptom, its prevalence being similar to that of patients with papillary tumors in the series of Adamson and colleagues.7 Other studies of adult craniopharyngioma have also shown a high prevalence of visual deficits.2,7,18,20 Postoperative improvement in vision, as seen in our patient group, has also been noted by others.1,7,18,20 Pituitary insufficiency also contributed significantly to the presenting signs and symptoms. It must be emphasized that surgical treatment did not restore pituitary function in any of our patients. Indeed, the frequency of pituitary insufficiency doubled postoperatively. Others have reported a similar experience.2,20 The weight gain observed in 42% of our patients was presumably hypothalamic in origin.

Radiographic Features

It is difficult to compare our imaging findings with those described in the literature because previous reports did not distinguish between adamantinomatous and papillary types. In our series, we noted both similarities and differences from previously published descriptions. Sixty-five percent of the lesions were cystic or predominantly cystic on imaging, which is similar to the previously reported incidence of 60%.19 The enhancement of the cyst wall and solid components on MR imaging and CT is also similar to that noted in usual craniopharyngiomas. It is noteworthy that none of the papillary craniopharyngiomas showed evidence on CT of calcification, a fairly common feature of adamantinomatous tumors.19 In contrast to usual craniopharyngioma, there was a distinct predilection to involve the third ventricle in our series: 41% either arose within or invaded the third ventricle. Most reported examples of intraventricular craniopharyngioma have been of the papillary type (Fig. 9).13

As a group, these lesions were more homogeneous on imaging studies when compared with previous reports, which describe a wide variety of CT densities ranging from cerebrospinal fluid to density greater than brain, and T1-weighted signal changes ranging from hypointense to hyperintense when compared with gray matter. In contrast, none of the lesions in our series demonstrated a density greater than brain on CT or hyperintense signal changes on T1-weighted MR imaging. The potential for rapid growth observed in two of our cases has not been a
Papillary craniopharyngioma features of the usual craniopharyngioma either. The absence of calcification, propensity to involve the third ventricle, and potential for rapid growth may help distinguish papillary and adamantinomatous tumors.

Pathological Features and Differential Diagnosis

The morphological features of papillary craniopharyngioma are distinctive and are, in most instances, easily recognizable. In our review we encountered a small number of tumors that were difficult to classify because their histological features overlapped those of other lesions. Thus, occasional examples showed features of both papillary and adamantinomatous differentiation, whereas distinction from Rathke’s cleft cyst was achieved only with difficulty in another two cases.

Distinguishing between papillary craniopharyngioma and Rathke’s cleft cyst is of considerable clinical and prognostic importance. It can be especially difficult in a small biopsy specimen because of the capacity of Rathke’s cleft cysts to undergo squamous differentiation and the presence in some papillary craniopharyngiomas of mucinous and ciliated cells. In such cases, the importance of correlating the radiographic and surgical findings with the tumor morphology cannot be overstressed. Histological features most useful in discriminating between papillary craniopharyngioma and other cystic lesions of the sellar region are listed in Table 5.

Treatment and Outcome

Patients who underwent gross total resection at initial surgery had a favorable prognosis. Although two of the 12 patients in this group with adequate follow up required a second operation for recurrence, all were free of tumor at last follow up. Not surprisingly, patients whose tumors were considered incompletely resected at initial surgery frequently experienced regrowth of residual tumor. However, even in this group of patients the final outcome was quite good: 78% were tumor free after ultimate salvage. Thus, even in cases in which only incomplete resection was initially achieved, a favorable outcome after salvage therapy may be expected. For this reason, an aggressive initial damaging operation should be avoided.

For patients in whom gross total resection was initially achieved, 83% remained free of tumor progression without further therapy; this result suggests that surgery alone is adequate therapy in such patients. In those with subtotal resection, the addition of postoperative radiation therapy improved the likelihood of freedom from tumor progression from 26% to 86%. Thus, gross total resection without postoperative radiation therapy and subtotal resection with postoperative radiation therapy had similar outcomes with regard to achieving tumor control. Comparable results have been observed in many other series.

Regarding the dose of external beam radiation, 100% local control was achieved in our series with doses greater than 5000 cGy. Based on data from this and other series, doses in the range of 5000 to 6000 cGy should be adequate.

Our preliminary analysis of the comparative outcome of patients with papillary and adamantinomatous craniopharyngioma showed no obvious differences in tumor-free survival for the two tumor types (Table 4). In the study performed by Adamson and colleagues, slightly more patients with papillary tumors had a good functional outcome. Comparison between the two series is complicated by the fact that nearly all patients in the study of Adamson and colleagues underwent gross total tumor removal and none received postoperative radiation therapy.

Conclusions

The papillary form of craniopharyngioma represents a distinct clinicopathological entity that forms part of a
spectrum of suprasellar cystic tumors. Aside from well-documented morphological distinctions, papillary craniopharyngiomas differ from adamantinomatous tumors in several important respects. These include the almost exclusive occurrence of papillary tumors in adulthood and their more uniform appearance on CT and MR imaging. However, a preliminary analysis of our data suggests there are no significant differences between the two lesions with respect to resectability, efficacy of radiation therapy, and overall survival.

References


Manuscript received February 2, 1994. Accepted in final form October 17, 1994.

Address reprint requests to: Bernd W. Scheithauer, M.D., Mayo Clinic, 200 First Street SW, Rochester, Minnesota 55905.