CONSIDERABLE confusion exists in regard to the classification and clinical behavior of malignant connective-tissue tumors of the dura mater. These neoplasms are infrequent in occurrence, bizarre in clinical behavior, and obscure in histogenesis. Since they are rare, opportunities for study and comparison of different examples are unusual, while the difficulties in establishing the precise site of origin and method of growth make such comparisons desirable. When a patient with one of these dural tumors enters the hospital, there is not sufficient understanding of the lesion to afford an adequate precedent for therapy. For these reasons, we have undertaken a description of three patients with clear-cut fibrosarcomas of the dura mater in childhood. Two of these presented similar clinical syndromes and pathological findings, while the third, histologically identical with the other two, was different in gross appearance, clinical behavior and prognosis.

In making a survey of the literature, it soon became apparent that a precise evaluation and classification of many reported cases would be difficult, owing to the brevity of the descriptions and the changes in conception of the nature of dural tumors since the publications were written. It seemed advisable, therefore, to discuss these tumors in relation to the grouping of tumors arising in the dural connective tissue now in use at this clinic rather than to attempt a discussion and review of all recorded examples.

Among the tumors of the meninges, a sharp distinction should be drawn between the sarcomas of the leptomeninges and the sarcomas of the dura. The sarcomas of the leptomeninges spread freely in the subarachnoid space and from there they extend into the Virchow-Robin spaces. In most instances, the sarcoma lies beneath, and does not penetrate, the arachnoid surface layer. Hence it does not involve the dura primarily and very rarely becomes involved with this structure in the course of its progression.3,15

The most frequent tumor occurring in the dura proper is the meningioma. Studies of a series of these tumors1 have indicated that the meningioma is not of pure fibroblastic origin but is a tumor with stroma. The meningioma arises from arachnoid cells, the source of arachnoid cells in the dura being the Pacchionian granulations. As these arachnoid cells undergo neoplasia, they stimulate a connective-tissue stroma for their support and nutrition. Their habit of growth is thus more like that of carcinoma than sarcoma. Similar conclusions have been reached by others.9 While the usual meningioma remains localized, certain examples exhibit definite malignant characteristics
(Bailey, Cushing and Eisenhardt, Globus and others). However, malignant meningiomas should be sharply differentiated from malignant dural tumors of purely connective-tissue origin.

When the reports of true sarcomas of the dura are considered, one is faced with the problem of evaluating descriptions in an attempt to determine whether or not “sarcoma,” “reticulum cell sarcoma,” “round cell sarcoma” and other terms are used for the same type of tumor or for distinct varieties. The three fibrosarcomas on which this report is based are essentially similar in histology to malignant tumors of collagenous connective tissue seen in sites outside the central nervous system. Neoplasms, apparently of this histological type, have been reported by others, in the dura as well as within the brain substance. While most of the fibrosarcomas of the dura recorded by others arose in the spinal meninges, all three instances in our series were intracranial. The three tumors described in this paper are histologically similar; one was localized and presented very different surgical problems and prognosis from the other two, which were diffuse and saccular in growth. It is unfortunate that we have no autopsy material to determine whether or not there were extracranial metastases. Certainly, there was no clinical evidence of them in any patient. Extracranial metastases from dural fibrosarcomas, however, have been recorded by Caner et al. and others.

DIFFUSE, SACCULAR FIBROSARCOMAS OF THE DURA MATER

The two dural fibrosarcomas in this group are almost identical in behavior and in histological characteristics. In both instances there was bilateral involvement of the dura by a diffuse malignant tumor which spread freely in the dura without demonstrable involvement of the underlying brain at any point. Each of these tumors consisted of two envelopes of neoplasm with a fluid-filled sac at the center. When exposed at operation, there was a layer of tumor immediately underlying the bone. In Case 1, the tumor had involved the bone and had extended through it into the inner layers of the scalp. A similar example was recorded by Jaeger, though the tumor described by him was more localized and hence resembled in its dural involvement Case 3 rather than Case 1. On cutting through the layer of tumor beneath the bone, a sac-like cavity was encountered. The inner surface of the sac was formed by another layer of tumor very similar to that forming the outer wall. The underlying arachnoid was smooth and glistening without infiltration by the neoplasm.

The situation and gross appearance of each tumor had many resemblances to a subdural hematoma. In making a diagnostic tap to determine whether or not that lesion was present, the operator might be misled by finding fluid in the precise location that it would be expected to occupy in a subdural hematoma. However, the fluid in both fibrosarcomas of the dura was brown and semigelatinous in character, whereas the fluid of a subdural hematoma is that of changed blood, the cells settling to the bottom, leaving a pigmented, supernatant fluid. All the fluid from the fibrosarcoma re-
mained uniformly dark brown after standing, even for many weeks. One patient (Case 1) came to the hospital with high intracranial pressure and separated cranial sutures. He was comatose at the time of admission. It was apparent that the intracranial pressure would have to be lowered as an emergency procedure before studies could be made. As is always done in our routine procedure in making a ventricular puncture, the needle was withdrawn at the point where the subdural space was apparently reached. It was in this region that brown, semigelatinous fluid was encountered. From this finding, the surgeon recognized that the lesion was not a subdural hematoma. Further evidence of neoplasm was already apparent in the prominence of the parietal bone. In Case 2, the patient on entry had a distinct hydrocephalus and a tentative diagnosis of subdural hematoma had been made by the physician referring the patient to the hospital. In the course of a tap undertaken to determine whether or not a subdural hematoma was present, the same kind of fluid was encountered as in Case 1. Because of this, exploration was carried out through an osteoplastic bone flap, when it became apparent that the dura would have to be sacrificed, and a large dural defect was created. In the closure of these and other similar large dural defects fibrin film made from human fibrinogen and thrombin served to protect the brain and to permit healing without the production of scar tissue.

The most outstanding features of the lesions as seen at operation were the diffuse bilateral involvement of the dura, the sac-like structure within the dura with walls of neoplasm continuous with the normal dura at the edges, and the lack of adherence to the underlying arachnoid and brain. From the standpoint of histology, both these tumors were composed of rapidly growing cells of fibrous-tissue origin which produced collagen fibers in varying amounts in different parts of the tumor.

The prognosis in these diffuse, saccular fibrosarcomas of the dura is obviously hopeless. Fibrosarcomas elsewhere are usually radioresistant; little benefit was expected from roentgen therapy. However, roentgen therapy was attempted in Case 1 with an unexpected result; the tumor responded very promptly and favorably to the treatment with disappearance of all symptoms. This excellent immediate result was soon followed by recurrence. Roentgen therapy was not instituted in Case 2 because the patient had had considerable irreversible damage to his brain as a consequence of the hydrocephalus secondary to the tumor. The first patient, however, had no irreparable damage to his brain and might have developed normally if recurrence had not taken place. Since the fibrosarcomas were confined to the dura and did not extend into the brain substance, injury to intracerebral tissues was present only when secondary damage due to increased intracranial pressure had taken place.

Case 1. Increased intracranial pressure from 3 months of age; at 5½ years, asymmetry of head. Exploration—diffuse, saccular tumor of dura. Histology—fibrosarcoma. Temporary improvement with roentgen therapy. Death 3 months after operation.

[Note: A brief report of this patient has been published in the Journal of Neurosurgery.]

in reference to the use of human fibrin foam and thrombin as a hemostatic agent and human fibrin film as a dural substitute. Figs. 5, 6 and 21 to 27 of the earlier paper provide additional illustrations of this patient.]

A.R. (C.H. 278750). A 53-year-old boy was sent into the hospital in coma. From birth he had vomited a great deal and at 2 months of age weighed only 4 pounds. At 3 months of age the attention of the family physician was called to the fact that his head was increasing in size very rapidly. He noted dilated scalp veins and a bulging fontanelle. For these, he gave medication, the nature of which is not known. At 4 months the patient had two severe falls in rapid succession and following the second he was stuporous for 2 days. His development in behavior was very retarded until the age of 3 years when he began to progress fairly well. Two months before admission his parents noticed a distinct change. He refused to eat, slept most of the time, and walked slowly and unsteadily, frequently bumping into objects.

Physical examination at the time of admission showed a fairly well developed, but poorly nourished boy lying on his left side with knees flexed. He could be aroused only by very strong stimulation. The head was abnormally large and in the right parietal region a firm mass the size and shape of half a golf ball was palpable. In the right mastoid region there was a similar but smaller and flatter swelling. The pupils were dilated and discs choked, the neck extremely stiff, and reflexes all hyperactive. Roentgen examination showed separation of the cranial sutures and irregular spotty destruction of the right parietal bone.

A diagnosis of intracranial tumor was made, but because of the patient's extremely poor condition it was decided to lower the intracranial pressure by tapping the right lateral ventricle through the coronal suture. As is customary in this clinic, the stylet was removed as soon as the dura was penetrated, and brown, semigelatinous fluid was recovered. It came freely through the needle and 15 cc. were removed. Following the removal of this fluid the patient's condition improved considerably and the improvement continued as the taps were
repeated during the following six days. At that time a large right temporo-parietal scalp flap was reflected and the bone involved by neoplasm removed (Figs. 1 and 4). Directly beneath this area there was a firm, round, flat tumor mass easily separable from the extensive tumor beneath it. The dura was found to be continuous with a firm flat tumor which separated easily into four layers. The dura and tumor under the bony defect was excised exposing a normal pia arachnoid and cortex beneath. A large amount of the thick fluid previously identified by tapping was removed from the central envelope of the tumor. The cortex was protected with fibrin film and the wound closed. A more extensive exploration was carried out six days later at which time a large bone flap was turned down around the bony defect (Fig. 2). The intracranial pressure was again elevated and the cortex was found to have protruded through the defect. The pressure was lowered by the removal of more cyst fluid and all easily available tumor excised. Its gross character was essentially the same throughout the field explored, i.e., it consisted of two huge envelopes one inside the other, the inner one containing large quantities of cyst fluid. This cavity could be seen to extend across the midline anteriorly. In no place was there seen to be any involvement of the arachnoid or of the cerebral cortex. At a later date, a burr hole was made in the left temporal region and the presence of identical tumor demonstrated.

Postoperatively, the patient received roentgen therapy, a total of 2850 r in twenty treatments. Following this, the palpable mass in the right mastoid region disappeared and the patient's condition improved remarkably. After several weeks of good general condition, he started to lose ground and died at home three months after admission to the hospital. (Unfortunately, knowledge of his death reached the hospital too late for any arrangement to be made for autopsy.)
Pathological Findings—Gross. The material submitted for study consisted of several parts. There was a flattened, rounded mass from the dural tumor. This had a diameter of 5.5 cm. and a thickness of 1.5 cm. The outer surface was grayish-pink in color. In most portions it was smooth but here and there it was perforated by soft pale gray tumor. The inner surface of the mass was pale gray and showed an irregular pattern of bluish and yellowish-gray areas. In consistency the tumor was moderately soft. The cut surface was glistening and had a rather gelatinous appearance in which a fine, irregular pattern of yellowish-gray strands could be recognized (Figs. 1 and 4). There were several smaller fragments of dura and tumor tissue varying in size from 1 cm. to 2.5 cm. in diameter. These had the same gross characteristics as the mass previously described.

In addition there was a portion of the skull that was slightly convex, its diameter measuring 8 cm. The outer table was covered with congested periosteum (Fig. 1). From its center protruded a roughly round mass, 8 cm. in diameter, which was raised about 1 cm. above the surrounding bone. It was covered by glistening connective tissue; this was perforated at one point near the border. The tumor in this location varied in consistency from moderately firm to soft. The inner table of the bone showed a very irregular surface roughened by impressions made by blood vessels and other underlying tissue (Fig. 4). In the center, there was an irregular round defect in which the bone was completely missing. This defect measured 1.8 cm. in diameter and was filled with soft tumor masses, pale gray and glistening. The edge of the defect was ragged.
Microscopic. Sections from all portions of the material were stained with eosin-methylene blue, hematoxylin and phloxine, Mallory's phosphotungstic acid-hematoxylin, Mallory's aniline blue connective-tissue stain and Foot's modification of the Bielschowsky-Maresch technic for the demonstration of reticulum. The tumor throughout showed an irregular proliferation of neoplastic cells varying considerably in size and shape. The type cell resembled a fibroblast; it was spindle-shaped and had a clear vesicular oval nucleus usually with several nucleoli (Fig. 6). Mitotic figures were seen in many areas. Collagen fibers were found in large numbers throughout the tissue and these often followed in their course the contours of the tumor cells (Fig. 3). In some areas the cells showed a tendency toward palisading but for the most part there was no regularity of arrangement. Some of the tumor cells were round or polygonal. The cytoplasm stained slightly basophilic and varied in amount. The nuclei were round or oval and very irregular in size. They showed considerable variation in the amount of chromatin. Multinucleated giant cells were present in some fields. While collagen was abundant in all portions of the tumor, it varied considerably in amount in different areas. It was more abundant in those regions where the cells more nearly resembled adult fibroblasts. Fibroglia fibrils were numerous but irregular in arrangement. Portions of the dura persisted in a few places and the relation of the tumor to the dura in these regions is shown in Fig. 5. No glial fibrils or nerve elements were present in any of the sections. Areas of necrosis were seen in many places throughout the tumor. These areas of necrosis were infiltrated with polymorphonuclear leucocytes. Blood vessels were not numerous. They were thin-walled and frequently the walls were invaded by tumor cells. Areas of hemorrhage were present in a few places.

Diagnosis. Fibrosarcoma.


H.M. (C.H. #288956). A 27-day-old male infant was referred to the hospital with the diagnosis of subdural hematoma. The birth history was not remarkable. He was considered normal until 11 days of age when he suddenly became deeply cyanotic. The anterior fontanelle was extremely tense and the cerebrospinal fluid pressure measured by lumbar puncture was 300 mm. of water. In the next two weeks his head enlarged 3 cm. in circumference; at that time he entered The Children's Hospital.

On admission, the only positive findings were poor nutrition, enlargement of the head (circumference 16½ inches) and a tense fontanelle. A lumbar puncture needle was passed into the subdural space on both sides and 10 cc. of brown semigelatinous fluid removed. This fluid
was exactly the same in gross appearance as that removed in Case 1. A small bone flap was turned down in the right parietal region and a similar tumor exposed. It consisted of four layers, the central two enveloping a large quantity of cyst fluid (Fig. 7). No attempt was made to remove more than sufficient tumor for histological study.

The patient was discharged home essentially unchanged. He remains alive but in very poor condition 7 months after operation.

Pathological Findings—Gross. The material submitted to the laboratory consisted of several lobular pieces of soft, glistening, pinkish-tan tissue which together measured \( 4 \times 2 \times 1 \) cm. There were several small hemorrhagic foci and in places areas of bright yellow tissue were encountered. No definite architecture could be made out in the gross though a bit of relatively uninvolved dura was attached to one section.

Microscopic. Sections were stained by the same technics as those used in Case 1. These showed very cellular malignant tumor consisting of closely packed spindle-shaped cells. In places these were arranged in whorls but usually they were growing in total disorder. The nuclei showed considerable variation in size and shape from small round structures to large irregular or oval forms. Some were vesicular and most of them presented a well stained chromatin pattern and atypical mitotic figures were seen. The cytoplasm was moderate in amount and sometimes rather poorly defined. The intercellular substance was moderate in amount and varied from delicate fibrils to rather coarse fibers. These followed the contour of the proliferating neoplastic cells (Fig. 8). There were a moderate number of very thin-walled blood vessels. Foci of hemorrhage were encountered in a few areas. A portion of the dura was extensively invaded by the neoplasm. The tumor itself contained no glial elements.

Diagnosis. Fibrosarcoma.
LOCALIZED, SOLID FIBROSARCOMA OF THE DURA MATER

In contrast to the two diffuse saccular fibrosarcomas of the dura, a solid localized fibrosarcoma of the dura was found in a patient entering the hospital because of left hemiplegia and increased intracranial pressure with separation of the cranial sutures. The skull was not invaded by the tumor, localization being made by means of the neurological findings. When an osteoplastic bone flap was turned down a space-occupying lesion was found exactly over the motor area of the right cerebral hemisphere. The tumor was easily dissected away from the motor area much as a meningioma might be separated from the underlying brain. It was found that the area of dural involvement was quite small so that only a small dural defect had to be made. The tumor was removed completely insofar as could be judged at the time of operation and the patient has remained well for a period of six years.

Histologically, the neoplasm was indistinguishable from those of the diffuse type. However, there was no cyst and the localized nature of the lesion made possible its complete eradication by radical surgery. The prognosis, therefore, was quite different from the prognosis of the diffuse saccular fibrosarcomas. In view of the cellular signs of malignancy, however, the long period of survival without recurrence has proved surprising. It indicates that radical extirpation of histologically unfavorable tumors may at times result in complete cure.


F.H. (C.H. s197480). At the age of 2½ years the patient was seen in the orthopedic outpatient department because of forefoot adduction. This was thought to be a mild congenital disorder and light casts were made. In a photograph made at the time of this visit, it is of interest that the left lower extremity was definitely more abnormal than the right. The patient was not seen again until he was 5 years old when he was admitted to the hospital because of weakness of the left hand. In the interim he had been perfectly well and had developed nor-
normally. Two months before entry, his mother noticed that there was difficulty in using his left hand. Shortly afterward some weakness of the left leg was noticed and he complained of headache. Stiffness of the neck and vomiting soon followed.

Physical examination showed a well developed and nourished boy in moderate distress. The deformity of the feet previously noted was still present and his head was unusually large. Percussion elicited a cracked pot sound and there was marked choking of the optic discs. There was weakness of the left shoulder, arm, and leg with increased reflexes throughout on the left side. Ankle clonus was easily elicited on the left and the Babinski response on this side was also positive. Roentgen examination of the skull showed separation of all the sutures, particularly the coronal, and thinning of the posterior clinoids (Fig. 9). Ventriculography revealed dilatation of the entire ventricular system with medial displacement of the right lateral ventricle.

A right bone flap was turned down and a small area of abnormal dura in the mid portion of the field was noted. At this point the dura was slightly yellow and contained a few white flecks. When the dura was reflected it was found that this part of the dura was adherent to a large firm tumor mass overlying the motor cortex. Several large vessels entering the mass were clipped and smaller ones coagulated with the endothermy. There were two clefts in the mass separating it into one large and two small portions (Fig. 10). These were removed separately with the small area of adherent dura. There was no continuity between the tumor and the cortex except by blood vessels. After the mass was removed there was a clear impres-
sion at its site but the arachnoid appeared to be intact. The dural defect was repaired and the wound closed.

The patient did well and was discharged on the eleventh postoperative day. The hemiplegia gradually disappeared and he is now entirely free from symptoms six years after extirpation of the tumor (Fig. 13).

**Pathological Findings—Gross.** The material as submitted to the laboratory consisted of tumor in three separate pieces. The combined weight of the portions was 90 grams. The largest piece of tissue was roughly kidney-shaped and presented a smooth, glistening, yellowish surface. It measured 7.5 × 5 × 4.5 cm. Attached to one surface was an irregular tab of tissue, yellowish-red in color and measuring 4 × 3 cm., with a thickness of 1 cm. The consistency was firm and resilient while the cut surface everted somewhat at the edges and was yellowish-gray in color. The outer aspect of the tumor mass was whitish-gray, firm and resilient. Throughout the cut surface a fine network of interlacing trabeculations was seen. The second portion of the tumor mass was roughly oval in shape and measured 4.4 × 3 × 2 cm. It resembled the first of the neoplasms very closely (Fig. 10). The third portion of tissue was soft and friable in consistency, irregular in outline and measured 3 × 2 × 1 cm. It was reddish-brown in color with mottled areas of yellowish-brown.

**Microscopic.** Sections were stained by the same technics as those used in Case 1. The tumor was composed of cells resembling fibroblasts and intercellular fibrils. The nuclei of the tumor cells were oval and vesicular. They showed evenly distributed chromatin in the form of moderately sized granules. Mitotic figures were occasionally noted. The cytoplasm was moder-
ately abundant and took a slightly bluish stain with the eosin-methylene blue technic. There was considerable variation in size of the cells, some being much larger and containing several nuclei, while others were small, more rounded and had rather scanty cytoplasm. Collagen fibers were numerous (Fig. 11) and an abundant reticular network was illustrated by Foot's technic. Since we regard collagen and reticulum as physically different states of the same substance, we consider the abundance of reticulum as further evidence of the fibroblastic origin of the tumor (Fig. 12). The blood vessels were not numerous and were for the most part thin-walled. No areas of hemorrhage were encountered.

**Diagnosis.** Fibrosarcoma.

**COMMENT**

The three tumors described in this paper resembled each other very closely in histological appearance. All three consisted of rapidly proliferating cells of fibroblastic type in varying stages of maturity. These cells were laying down collagen fibers. Mitotic figures were present and there was evidence of rapid growth. They correspond, therefore, quite clearly to fibrosarcomas, in whatever connective tissue they arise. From the standpoint of operative findings and gross examination, however, the three tumors fall in two dis-
Distinct groups; one group being diffuse and saccular, while the other was solid and localized.

Pathological studies of these tumors indicated that they did not belong to the group of meningiomas and were clearly distinguishable from tumors of arachnoid cells. They also bore little if any resemblance to the small-cell tumors with little or no collagen production that have been described by various authors. It is of special importance in understanding the fibrosarcomas reported in this paper to differentiate them clearly from the sarcomas of the leptomeninges.

All three patients were under 5 years of age. We do not regard this as suggesting that such tumors are confined to childhood but the exact counterpart of the diffuse, saccular group has not been found in the large collection of adult intracranial tumors in the files of the Peter Bent Brigham Hospital, though dural fibrosarcomas of the localized solid type have been reported from that hospital by Cushing. Fibrosarcomas in the spinal dura have been reported (Wakeley and others).

Fibrosarcomas of the spinal dura present a clinical syndrome occasioned by a space-occupying lesion compressing the spinal cord. However, the solid localized fibrosarcoma of the cerebral meninges reported in this paper produced its clinical syndrome by increase of the intracranial pressure and localized compression of the underlying cerebral tissue. The diffuse saccular fibrosarcomas resulted in clinical manifestations more like those of subdural hematoma. These resemblances were sufficiently striking for Case 2 to be referred to the hospital with a tentative diagnosis of subdural hematoma. The confusion was less in Case 1 because of the asymmetry of the skull, a finding that pointed directly toward a diagnosis of an invasive neoplasm.

Fig. 13. Case 3. Left, Patient 6 months after operation. Right, Patient 6 years after operation. At the present time, the patient is entirely free from symptoms.
Because of the hopeless prognosis, it might appear that exploration should not be carried out if brown, semigelatinous fluid were obtained in the course of a ventricular tap. However, even with the evidence afforded by the character of the fluid, it would be better to explore all patients suspected of having malignant dural tumors. The exact characteristics of the lesions can then be visualized and too few instances have been studied to permit general conclusions. It is difficult for the surgeon to be sure preoperatively that he is not dealing with a limited, removable tumor containing a cyst. However, such evidence as may be gleaned from this small series would suggest that solid fibrosarcomas of the dura may be localized and favorable for radical extirpation while those of the diffuse saccular type are hopeless. Exploration can do no harm while failure to explore might prevent successful attack on a lesion that could be dealt with surgically. While we have never encountered a cystic teratoma in the same region as these diffuse saccular fibrosarcomas, it is possible that one might take origin at that point. Then a benign lesion of a different histogenesis might be allowed to result fatally if exploration were not carried out when brown, semigelatinous fluid was obtained in the course of a ventricular tap.

The results of roentgen therapy in Case 1 were completely unexpected. There have been very few tumors reported in the literature that are exactly comparable to those of the series here described and have been treated in the same way. For this reason, no very general conclusions can be drawn as to the efficacy of roentgen therapy. In fibrosarcomas of the dura, however, it seems worthwhile trying this form of treatment if the underlying brain is intact. The tumors in our series did not extend into the underlying brain; damage to vital centers and to intelligence were only the result of secondary changes resulting from pressure. The satisfactory immediate response in Case 1 suggests the value of trying any form of therapy that offers promise of combatting the tumor. If the tumor is controlled before irreversible secondary changes have developed in the cerebral tissues, a favorable result may be expected. The underlying brain in Case 2 was damaged because the patient had an expansile skull and did not show signs of increased intracranial pressure until the tumor had caused irreparable damage to the brain itself. No form of therapy could then be expected to restore the patient to complete physical and mental health.

Quite a different situation existed in dealing with the localized solid fibrosarcoma in Case 3. There surgery alone effected a cure with complete regression of neurological findings, and satisfactory growth and intelligence have followed for a period of 6 years.

The study of these three patients with intracranial fibrosarcomas of the dura mater has served to indicate the great variation in method of growth that may take place in tumors of identical histology. Not only does the prognosis in a given tumor depend upon its histology but upon its location and extent.
SUMMARY

Three examples of intracranial fibrosarcoma of the dura in childhood are presented. Two of these were diffuse, saccular neoplasms which were bilateral at the time of operation and were hopeless in prognosis. The third was a localized, solid lesion which did not recur and the patient is symptom-free 6 years after operation.

Fibrosarcomas of the dura should be sharply differentiated from leptomeningeal sarcoma and from invasive meningiomas. These fibrosarcomas of the dura resembled extracranial fibrosarcomas in histology but showed considerable differences in method of growth and progression.

REFERENCES