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Lipomeningioma: Report of Three Cases and Review of the Literature

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Lipomeningioma is a benign tumor of the meninges that contains mature adipose tissue. It demonstrates fat density on computed tomographic scan and mixed signal intensities on magnetic resonance imaging scan. Although the pluripotential nature of the mesenchymal cell has long been recognized, only a single case with this diagnosis has been documented in the literature to date. Three patients with this diagnosis seen at the Johns Hopkins Hospital during the last two years are presented, and the literature is reviewed. (*Neurosurgery* 25:122–126, 1989)

Key words: Adipose tissue, Computed tomography, Magnetic resonance imaging, Meningioma, Pathology

INTRODUCTION

The diversity of meningiomas has long been recognized (1, 8, 12, 19) and attributed to the pluripotential nature of mesenchymal cells (4, 10), whose origin is attributed to the neural crest (9, 14).

Bailey and Bucy (1), in 1931, and Cushing and Eisenhardt (8), in 1938, categorized the meningiomas into nine different groups, depending on the predominant component tissue. In 1952, Lapresle et al. emphasized the characteristic "whorl" and classified the meningiomas into three "basic" types: *meningocytic, fibroblastic,* or *mixed.* Each of these three types can include secondary components that become responsible for polymorphism; hence, the designations *angioblastic, osseous, chondrous, lipomatous,* etc.

Virchow (18) was among the pioneers to state that lipomas may arise from the human meninges. Later, several authors reported intracranial and intraspinal tumors consisting of or containing lipocytic masses in various grades of differentiation. These include Ritter's (15) report of a solitary lipoblastoma in 1920; Caldwell and Zinninger's (6) report of a pure extradural liposarcoma in 1925; Bailey and Bucy's (1) and Misch's (13) reports of meningeal lipoma in 1931 and 1935, respectively; Zettner and Netsky's (20) report of lipoma of the corpus callosum in 1960; Berger's (2) and Kothandaram's (11) reports of dural liposarcoma in 1929 and 1970, respectively; Shuangshoti's (17) report of liposarcomatous meningioma in 1973 (17); and a review by Christensen et al. (7) of lipoma of the cerebellopontine angle in 1986.

A true benign "lipomeningioma" is characterized by adipose tissue elements admixed with the meningioma. This tumor should be distinguished from malignant fatty tumors or meningiomas with a xanthomatous infiltrate.

Although several prominent authors include lipomeningioma in their classification of meningioma types, their series fall short of documenting even a single case with this diagnosis (8). Other authors do not even include this variant in their accounts of the pathology of meningiomas (3, 16). Bostroem (5) described a few cases from Germany in 1897, but offered no illustrations in support. In our literature review, Kasantikul and Brown (10) seemed to have the first and only documented case report of a true lipomatous meningioma.

During the last 2 years, three cases of true lipomeningioma were encountered at the Johns Hopkins Hospital. The clinical behavior, radiological features, characteristics at surgical resection, and pathognomonic microscopic appearance are hereby documented. These cases are presented here with particular attention to distinguishing the true lipomeningioma from related entities.

Case 1

A 64-year-old woman was admitted because of dysphasia and weakness on the left side that had progressed over 4 months. Her physical examination revealed left hemiparesis more pronounced in the face and arm than in the leg. There were no other physical findings. A computed tomographic (CT) scan demonstrated an extra-axial mass with lipid density in the right frontal area.

Four months after this initial examination, she underwent a frontal craniotomy. A meningioma originating from the frontal parasagittal dura was directly visible. The tumor separated easily from the brain and allowed total removal. Histological examination revealed a benign, well-encapsulated meningioma infiltrated with mature adipose tissue and containing focal hemorrhages and focal calcifications.

The patient's hemiparesis abated within 6 days postoperatively.

Case 2

A 63-year-old woman was hospitalized for investigation after having experienced a single, sudden episode of "zig zag and diagonal lights" flashing throughout the visual fields. That episode lasted about 15 minutes and was free of sensory and motor deficits or loss of consciousness. There was no history of tonic-clonic seizures, transient ischemic attacks, or headaches. She had previously been healthy, except for two thyroid nodules that had been resected 20 years earlier. Her history was significant with regard to her mother, who died at age 81 years of a brain tumor that was not biopsied but was confirmed by CT scan.

On initial evaluation, her neurological examination was unremarkable, except for mild, homonymous, right hemianopsia and impaired graphesthesia on the right. Radiological studies revealed a well-demarcated tumor in the left parietooccipital region showing uniform lipid density (Fig. 1, *A* and *B*).

A left parietooccipital craniotomy was performed and a lipomatous tumor fed by arteries arising from the arachnoid membrane was found. The venous drainage was through dural veins, despite the lack of specific attachment to the dura. There was a clear plane separating the tumor from the brain substance (Fig. 2). This allowed resection of the tumor in one piece. No invasion of the dura or brain was evident. On

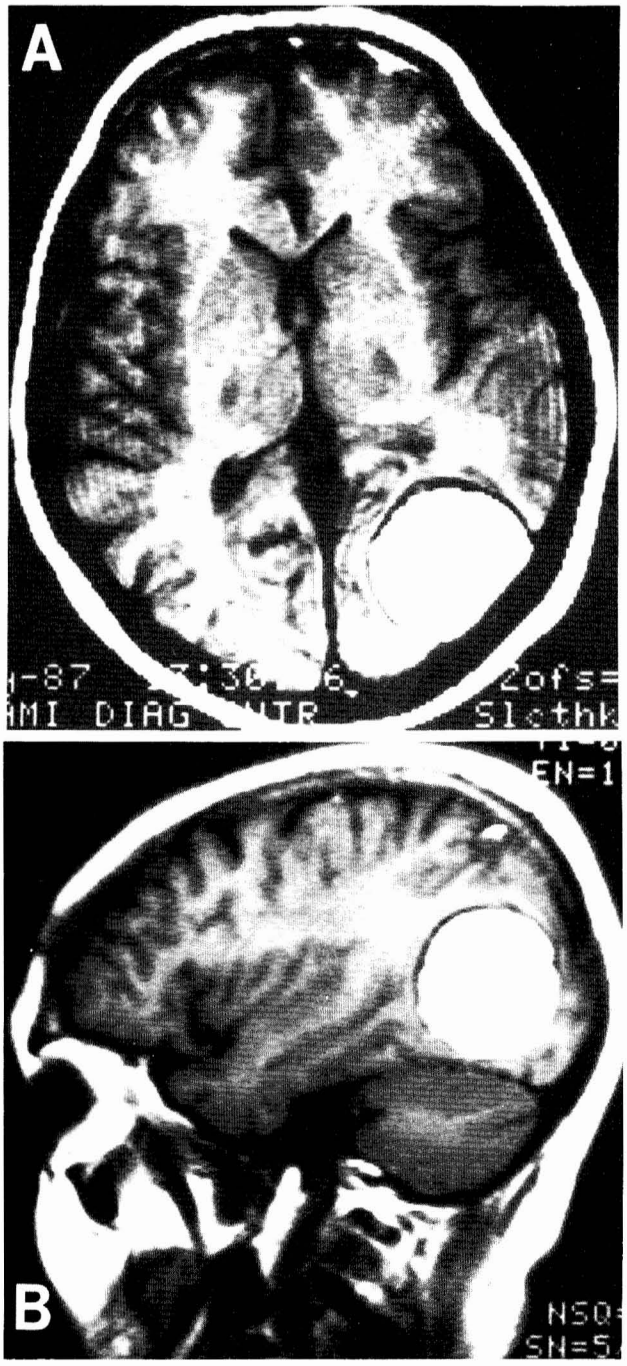

FIG. 1. Case 2. Transverse (*A*) and sagittal (*B*) MRI scans (T1-weighted) demonstrating the uniform appearance of lipid density in the tumor. Note the clear distinction of the tumor from the surrounding brain.

pathological examination, the tumor appeared to be a meningioma extensively infiltrated with mature adipose tissue.

Postoperatively, the patient did well and had no new neurological deficits. One year later, she underwent an uneventful resection of a meningioma of the contralateral sphenoid wing. The histological assessment of the latter lesion was that it was a routine, nonlipomatous meningioma.

Case 3

A 65-year-old woman was examined because of recurrent episodes of gait disturbance. The patient had been complaining of recurrent occipital headaches for 1 year. Three months previously, she had noted increasingly frequent dizzy spells, nausea, vomiting, and recurrent falling, as well as a single incident of frank motor apraxia relating to her lower extremities.

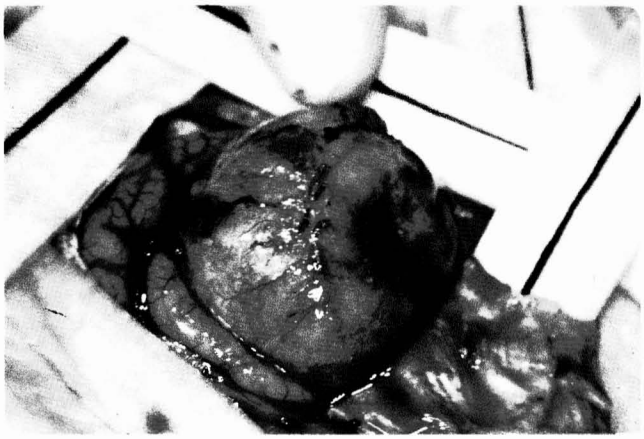

FIG. 2. Case 2. Operative photograph of the lipomeningioma being resected in toto after easy separation from the surrounding brain tissue.

Physical examination disclosed severe ataxia. The patient's facial movement and sensation were normal, but her hearing was impaired on the right. There was mild nystagmus on lateral gaze bilaterally.

A cranial CT scan disclosed a large (6 cm) tumor in the right cerebellopontine angle. The tumor contained areas of fat density (Fig. 3). A magnetic resonance imaging (MRI) scan revealed variable signal intensity within the tumor, which displaced the cerebellar vermis and the brain stem (Fig. 4). There was no definite hypervascularity, nor were there dilated blood vessels in the mass lesion.

Despite the large size of the tumor, it separated easily from the cerebellum and the brain stem. The tumor originated from the temporal bone just posterior to the internal acoustic meatus. It displaced cranial nerves V, VII, VIII, IX, and X anteriorly, but did not envelope them.

DISCUSSION

Among the recorded cases of lipomeningioma, no pathognomonic sign or symptom was found in the patients' medical histories or in the physical or neurological examinations. A small, isolated meningioma was found in one patient, at the greater wing of the sphenoid bone on the side contralateral to the lipomeningioma.

All three patients underwent CT and MRI scans. The CT scans typically showed a well-demarcated, large tumor containing multiple small areas of fat density. With such a picture on the CT scan, a differential diagnosis could include a dermoid or epidermoid cyst, a fat-containing meningioma, or a neurofibroma. The MRI scans demonstrated mixed signal intensity that ranged from hyper- to hypointense on the T1-weighted images (Figs. 1 and 4*A*), and from isointense to slightly hypointense on the T2-weighted images (Fig. 4*B*).

Intraoperatively, the tumor masses were grossly apparent in all three patients and were not attached to contiguous brain structures, from which they were separated with ease (Fig. 2). The tumors all contained evident clumps of mature adipose tissue.

In all three cases, the tumors were composed of spindled and whorled cells with regular, ovoid nuclei and moderate

FIG. 3. Case 3. Contrast-enhanced cranial CT scan showing well-demarcated tumor in the right cerebellopontine angle. Note the heterogeneity due to areas of fat density within the meningioma.

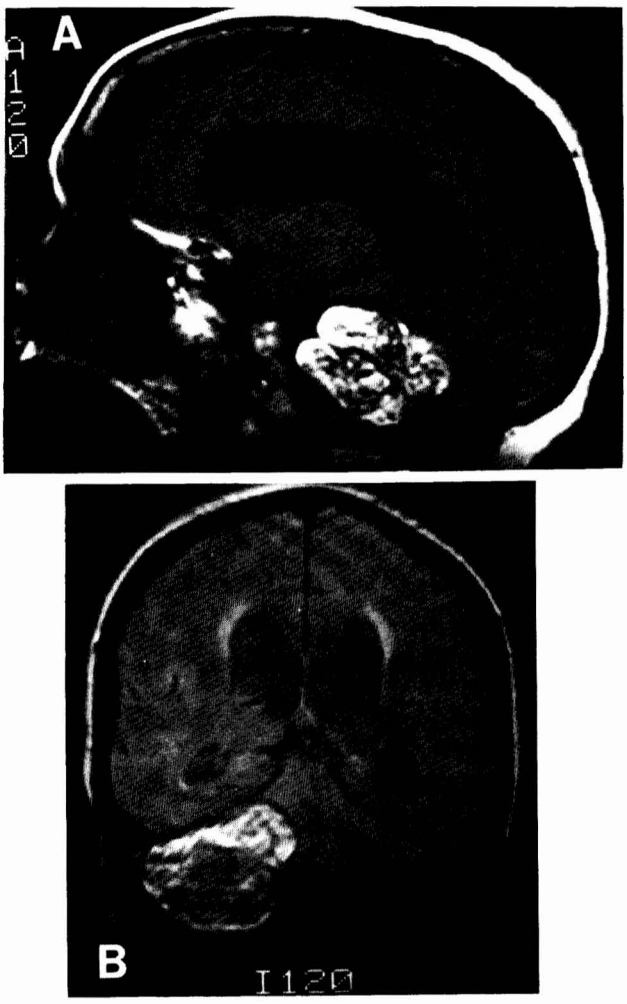

FIG. 4. Case 3. *A*, T1-weighted sagittal MRI scan showing a range of signal intensity in the tumor. *B*, T2-weighted coronal MRI scan.

amounts of eosinophilic cytoplasm. Psammoma bodies (laminated calcifications) were seen in two of the three cases. Abundant, mature adipose tissue was seen intimately intermingled with the meningiomatous portion of each tumor (Fig. 5). Recognition of the fatty component of the tumor was often difficult on frozen section but was easily appreciated on the paraffin-embedded, formalin-fixed material.

The intraoperative distinction between lipomeningioma and lipoma is especially important in cases involving the region of the cerebellopontine (CP) angle, since the management of the two lesions differs considerably. Lipomas of the CP angle intermingle with and splay the cranial nerves, and attempts at resection tend to result in greater deficit than biopsy alone (7). Lipomeningiomas, on the other hand, do not become entangled with the cranial nerves and are likely to allow complete resection. Consequently, when dealing with a lipomatous lesion of the CP angle, it is important to attempt to distinguish whether it is a lipoma or a lipomeningioma. Recognize, however, that both lesions may have large regions containing pure adipose tissue, making the distinction on frozen section difficult without multiple tumor samples.

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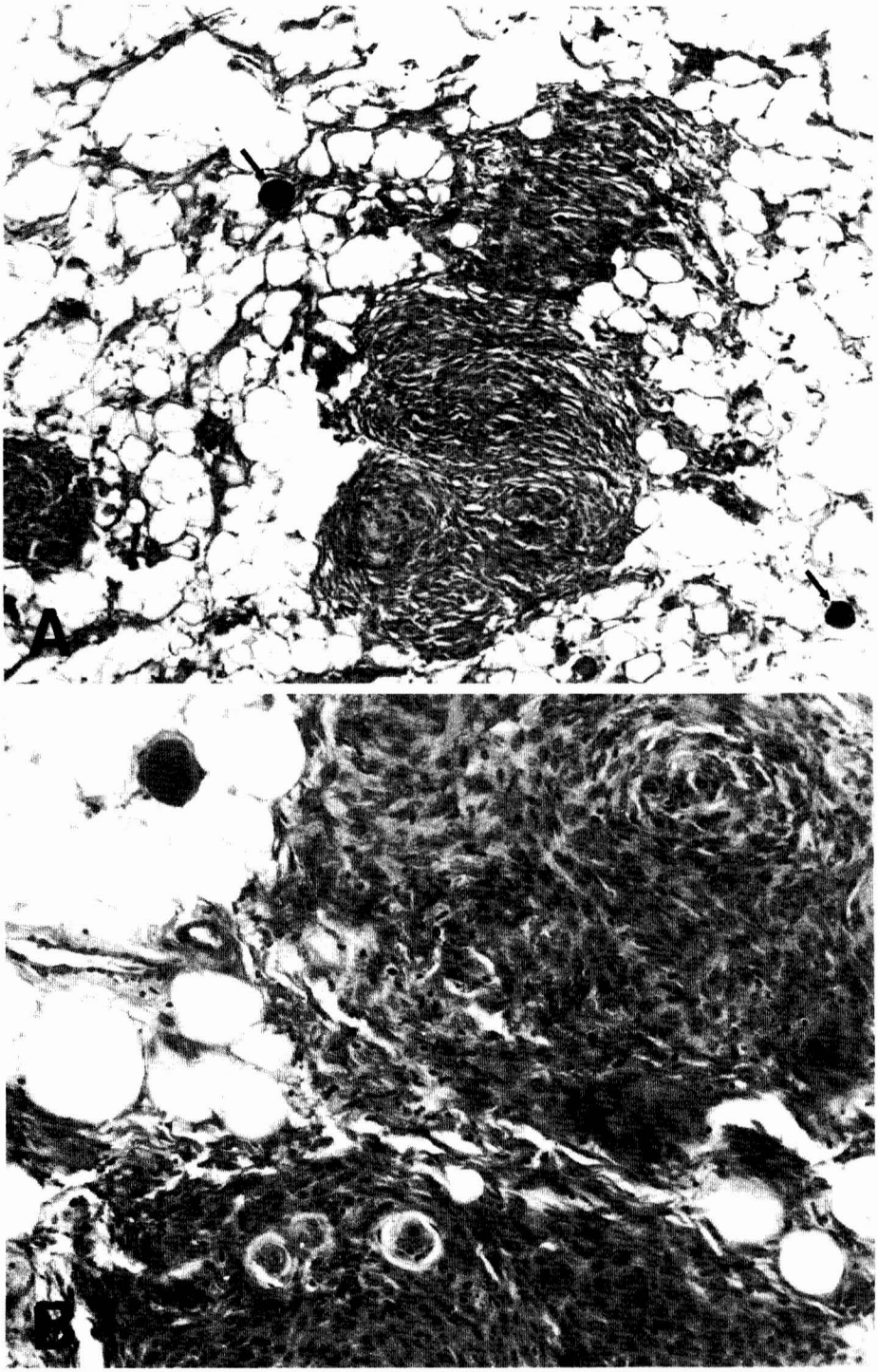

FIG. 5. Case 2. *A*, low-power photomicrograph showing typical meningioma intimately admixed with mature adipose tissue (*arrows*, psammoma bodies). *B*, high-power photomicrograph demonstrating the characteristic features of meningioma, including spindled and whorled cells with bland, ovoid nuclei admixed with fat. A psammoma body is seen in the adipose tissue in the upper left corner. These photomicrographs are representative of all three cases.

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Aspergillus Disc Space Infection: Case Report and Review of the Literature

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Aspergillus disc space infection is an unusual complication of the immunocompromised state. Magnetic resonance imaging may aid the clinician in arriving at a prompt diagnosis of discitis in affected patients. We report a case of systemically acquired *Aspergillus* discitis at multiple levels diagnosed by plain x-ray films, bone scan, magnetic resonance imaging, and biopsy. We review the literature on this subject and suggest that aggressive diagnosis with early biopsy, treatment with systemic antifungal agents, and surgical debridement of the infected disc space yield the best outcome for these patients. (*Neurosurgery* 25:126–129, 1989)

Key words: *Aspergillus fumigatus*, Intervertebral disc, Magnetic resonance imaging, Mycosis

INTRODUCTION

Intervertebral disc space infection is an uncommon complication of disc surgery and a rarer complication of systemic infection. The prevalence of this disease may be higher than suspected, especially in immunocompromised hosts, and it may involve a variety of opportunistic organisms. Newer radiological tools increase our ability to make the diagnosis of discitis. We report a case of systemically acquired *Aspergillus* disc space infection involving multiple disc spaces diagnosed by plain x-ray films, bone scan, magnetic resonance imaging (MRI), and biopsy. We review the literature concerning this unusual entity and suggest a treatment regimen.

CASE REPORT

A 62-year-old man was transferred to Duke University Medical Center for evaluation of back pain of 2 months' duration. He had been in good health until 10 months before admission, when proteinuria was found on routine examination. A renal biopsy showed chronic membranous glomerulonephritis. Because of worsening renal failure 5 months before admission, prednisone (90 mg/d) was prescribed. Four months before admission, the patient suffered a perforated sigmoid diverticulum and *Escherichia coli* peritonitis. He underwent resection of the sigmoid colon and colostomy placement. Two months before admission he began complaining of low back pain. Thoracic and lumbosacral spinal x-ray films showed diffuse degenerative joint disease and mild marginal spurring at multiple levels, but no other abnormalities. An abdominal computed tomographic (CT) scan disclosed no abnormalities except mild aneurysmal dilatation of the abdominal aorta. A bone scan showed diffuse uptake throughout the thoracic and lumbar spine consistent with degenerative joint disease.

A lumbar CT scan showed herniation of the nucleus pulposus at L4–L5, centrally and to the left. During this time, the patient's sedimentation rate (Westergren method) was 152 mm/hr and 175 mm/hr on two separate occasions. He developed pulmonary infiltrates, and bronchoscopy specimens showed fungal elements. Cultures grew a *Candida* species. The infiltrates cleared without specific therapy. One month before admission, new plain x-ray films showed blurring of the inferior margin of T11 and the superior margin of T12, raising concern over the possibility of disc space infection. In the weeks after these films were taken, the patient's prednisone had been systematically reduced until he was taking 15 mg every other day.

At the time of admission, the patient complained of dull, aching, low back pain that increased with movement and was unchanged with coughing or straining. The patient denied radiation into his legs, weakness, paresthesia, or change in bowel or bladder function. He denied fever, chills, or night sweats. On admission, he was afebrile with normal vital signs. The general physical examination found no abnormalities. The pertinent findings on neurological examination were 2+ reflexes bilaterally in the upper extremities and 3+ reflexes bilaterally in the lower extremities; tenderness on palpation of the upper lumbar vertebrae with mild paravertebral muscle spasm; a positive straight leg raising test on the left at 45°, and a negative straight leg raising test on the right. The remainder of the neurological examination found no other abnormalities.

The patient's white blood cell count was 8,400 cells/mm^3 with a normal differential. The sedimentation rate was 130 mm/hr. His hemoglobin was 9.2 g and his hematocrit was 27%. Platelets, electrolytes, and the findings of coagulation