PRIMARY pigmented lesions of the CNS are uncommon and range from melanosis of the leptomeninges to malignant melanoma. The term “meningeal melanocytoma” was first proposed by Limas and Tio in 1972 to describe a lesion that exhibits the microscopic features of a meningioma but the ultrastructural and immunohistochemical characteristics of a melanocytic tumor. We describe the first case of a histologically identified melanocytoma of the cerebellopontine angle that turned into a primary malignant melanoma within a short time.

Case Report

History and Examination. This 37-year-old woman presented in the year 2000 with progressive brainstem syndrome due to a tumor, originally diagnosed and treated 12 years earlier, that extended from the petroclival area to the anterior craniocervical junction. The histological workup following subtotal tumor resection of the initial tumor had revealed the typical features of a fibrous melanocytic meningioma without increased proliferation. Ten years after the patient had completed treatment for the melanocytic meningioma, control neuroimaging demonstrated growth of the residual tumor with compression of the brainstem. Another neurosurgical intervention revealed a dark tumor of hard consistency. At this time immunohistochemical examinations demonstrated melanocytic features (expression of vimentin, S100 protein, and melan A) of the lesion with focally increased proliferation (5% of Ki-67–positive cells) but no higher mitotic activity. Clinical signs of deterioration along with imaging-confirmed tumor progression precipitated another operation within 7 months. A neuropathological examination revealed epithelial and anaplastic changes and indicated that the MIB-1 indices were greater than 25%. Pleomorphic changes and a focal high mitotic activity led to the diagnosis of a primary cerebral malignant melanoma. The patient’s later clinical course consisted of a rapid diffuse meningeal spread of the lesion throughout the entire brain and spine. Despite whole-brain and stereotactic radiation therapy as well as chemotherapy, the patient died 4 months after the last neuropathological diagnosis. The biological behavior of a melanocytoma is variable and recurrence may happen after subtotal resection, but intracranial transition into a malignant melanoma has not been observed previously.

Key Words • brain neoplasm • melanocytoma • melanoma • meningioma

Abbreviations used in this paper: CNS = central nervous system; MR = magnetic resonance.
months. Neuropathological examinations revealed epithelial and anaplastic changes and MIB-1 indices greater than 25% (Fig. 1). The immunohistochemical analysis demonstrated similar results, but the lesion’s epithelioid appearance, pleomorphic changes, high nucleus/cytoplasm ratio with vacuoles, and focal high mitotic activity led to the diagnosis of a primary cerebral malignant melanoma.

Postoperative Course. The patient’s postoperative clinical course exhibited a rapid diffuse meningeal spread of the tumor throughout the entire brain and spine. Despite whole-brain (40.8 Gy) radiation therapy as well as chemotherapy (Temozolomide 200 mg/m²), the patient died 4 months after the last operation. Permission to perform an autopsy was denied.

Discussion

Pigmented cells are normally found in the leptomeninges and, according to Virchow, were first described by Valenti. Primary malignant melanomas have long been known to occur in the CNS. Most reported lesions have occurred either in the spinal canal or the posterior fossa because of the higher concentrations of melanocytes in the leptomeninges at the anterior and lateral surfaces of the spinal cord and the medulla oblongata. In 1940, however, Ray and Foot described two cases of leptomeningeal melanotic tumors that followed a benign course. These tumors were once referred to as melanotic, melanoblastic, or pigmented meningiomas but ultrastructural studies have shown the melanocytic nature of these lesions. It is assumed that melanocytoma of the dura mater represents an area of meningeal melanocytosis that has undergone a nodular neoplastic proliferation.

Histologically, the meninges-based neoplasms are characterized by interlacing fascicles of spindle cells, with a fusiform or polygonal appearance and foci of epitheloid differentiation. There is abundant melanin deposition. Rare mitoses can be seen, but necrosis, hemorrhage, and pleomorphism are very unusual. Immunohistochemical analysis as a means to differentiate between melanocytomas and melanomas remains difficult. Both lesions stain positively for S100 protein and HMB-45. Melanocytomas can exhibit vimentin but are negative for epithelial membrane antigen, the presence of the latter being typical for meningiomas.

Brat and colleagues classified melanocytic lesions of the CNS with respect to focal mass lesions as low grade (melanocytomas) and high grade (melanoma). They placed a minority of lesions in an intermediate category because these tumors displayed increased mitotic activity and hypercellularity but not to the degree that one should categorize them as high-grade lesions. All groups were separate histological entities and transformation of a low-grade melanocytoma or an intermediate melanocytoma into a high-grade melanoma with subsequent leptomeningeal metastasis has not been described.

Several reports contain descriptions of an optic disc melanoma that develops several years after a melanocytoma has been diagnosed. Two cases of malignant transformation of spinal melanocytomas have been reported in the literature but the histological details are missing. A metastasizing spinal melanocytoma has been described in another patient, which is not an uncommon feature in this type of tumor entity; however, intracranial transformation of a melanocytoma with subsequent leptomeningeal spread has never been reported.

The appearance of melanocytomas on neuroimaging studies is well described. On MR images these lesions usually appear isointense on T₁-weighted images and display homogeneous enhancement after Gd administration. Melanocytomas share some features of meningiomas, namely, attachment to the dura mater and, occasionally, local brain invasion. Their appearance on computerized tomography scans is often one of a dura-based iso- to high-density mass that enhances homogeneously.

Melanomas differ in that they often display a heteroge-
lowes a Gd injection (Fig. 2).22 Therefore, a thorough physical examination should be performed in the presence of a cerebral melanoma to exclude the possibility of a primary cutaneous, mucosal, or ocular melanoma, although the solitary appearance attached to the leptomeninges may indicate a primary process. Due to the slow growth of melanocytomas, the use of postoperative radiation therapy must be individualized and should be reserved for those patients with symptomatic residual or recurrent tumors.14 Malignant melanomas require postoperative adjuvant radiation as well as chemotherapy, either following glioma protocols or cutaneous tumor approaches.

Although grossly resembling a meningoia, melanocytomas lack the histological and immunohistochemical features of a meningoia. The biological behavior of melanocytomas is variable and recurrence may happen after subtotal resection; however, prior to this case the transition of a meningeal melanocytoma into a primary cerebral melanoma of the brain had not been observed.

References

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Meningeal melanocytoma transition


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