Bone and Lung Metastases from Intracranial Meningioma

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Abstract. *Fifteen percent of intracranial tumors are represented by meningiomas. Meningioma is usually a benign neoplasm; malignant histology is rare and represents about 2-10% with a 43% incidence of metastasis. The most frequent site of metastasis is the lung and rare are other sites. There are no definitive criteria to predict the recurrence or metastases of meningioma and histological grading, according to WHO criteria, is the most important predictor of malignancy. A rare case of a woman with a relapse of intracranial meningioma in the right frontal lobe who subsequently developed simultaneous bone and intrapulmonary metastases is reported. According to these sites of metastases, it is suggested that in patients with a history of relapsed meningioma, a total body CT scan should be performed in order to investigate other possible sites of disease.*

Meningioma is one of the most frequently encountered tumors of the central nervous system that arise from meningothelial cells. They form a heterogeneous group of mostly benign tumors with slow growth, however malignant meningioma has an incidence of 2-10% (1). Malignant meningioma shows local invasion, involving the venous sinuses, dura mater, skull scalp and brain (2). Metastatic meningioma is rare with an incidence of 1 in 1,000 meningiomas and the lung is the most frequent site for metastasis (3, 4). Histopathological diagnosis of metastatic meningioma is difficult (5) and there are no criteria to predict the recurrence or widespreading of meningioma (3, 6). An unusual case of recurrent meningioma with bone and intrapulmonary metastases in a 57-year old woman, is reported.

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Key Words: Malignant meningioma, lung and bone metastases.

Case report

A 57-year old woman with a clinical history of headaches underwent surgery for intracranial meningioma of the right frontal lobe, in May, 2004. After 12 months, a magnetic resonance (MR) of the brain showed an enhancement of dural plane suspect for relapse of disease at the site of the previous craniectomy (Figure 1). An excision of the brain lesion was performed and a meningioma recurrence was histologically documented. In November 2005, after severe pain on the left side of the thorax was performed by the patient, a CT scan was performed, showing multiple bilateral pulmonary nodules, the largest one with a diameter of 3.5 cm and a lesion of the fourth left rib (Figure 2). A fine needle aspiration biopsy (FNAB) of the largest lung lesion was not diagnostic, however a FNAB of the left rib was performed and metastases from malignant meningioma were detected. At the same time, a brain MR showed an area with enhancement on the site of the previous surgeries in relation to relapse (Figure 3). The patient received 4 courses of chemotherapy, repeated every 3 weeks, with vincristine 1.5 mg/m^2 day 1, adriamycin 90 mg/m^2 day 1 and 2, cyclophosphamide 3600 mg/m^2 day 1 and 2. The patient had no severe toxicity. A total body CT scan performed at the end of the fourth course showed stable disease at the lung, bone and brain. Six weeks after the end of chemotherapy, the patient was treated with whole brain radiotherapy with a total dose of 58 Gy. At six months from diagnosis of metastases the patient is alive, with disease progression of metastases on the dorsal and lumbar spine .

Discussion

According to WHO criteria, there are three grades of histopathological subtypes of meningioma: meningioma, atypical meningioma and malignant meningioma. Meningiomas (WHO grade I) represent 15% of intracranial neoplasms and usually occur between the ages of 20 and 60 in woman, with a peak incidence at 45; radical surgery provides a cure for most patients with accessible tumors.

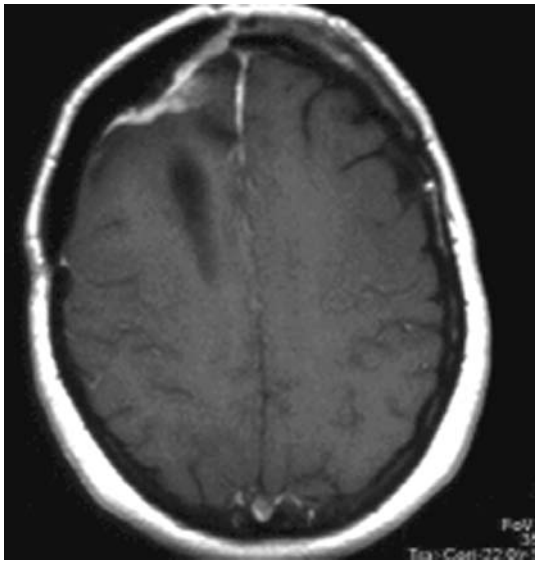

Figure 1. *Magnetic resonance spin echo (MRSE) T1 sequence after Gd-DTPA infusion in axial plane 12 months after surgery. MR shows right frontal craniectomy with enhancement of dural plane suspect for relapse.*

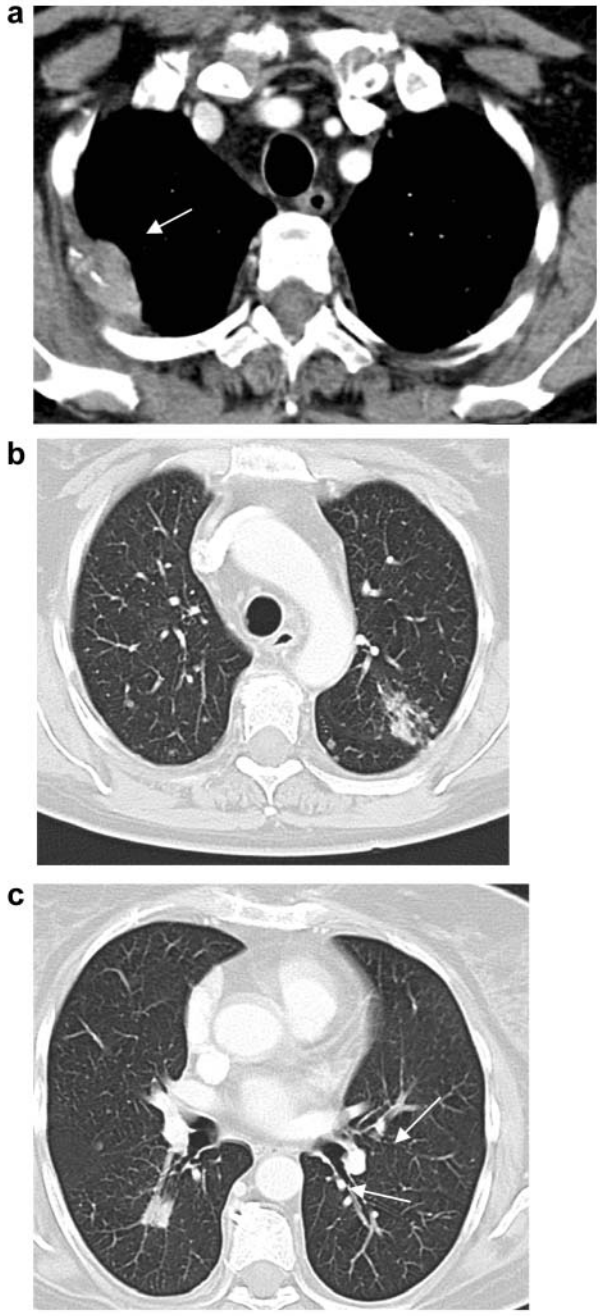

Figure 2. *CT examination after contrast medium infusion revealed: (a) the presence of metastases on the rib (b) and bilaterally in the lung (c) (arrows).*

Malignant meningiomas represent about 1.7 to 4.2% of all meningiomas (7), and originate from the arachnoid cap cells with equal gender predilection and a peak incidence in the seventh decade (7, 8). Malignant meningioma (WHO grade III) are distinguished from atypical meningioma (WHO grade II) by microscopic features: mitotic index, hypercellularity, loss of architecture, tumor necrosis, nuclear pleomorphism and ability of brain invasion. There are no definitive criteria to predict the ability of meningioma to recur and histological grade seems to be most important predictor of recurrence or metastases. Immunohistochemical analysis of a nuclear protein related to cell proliferation, Ki-67, or of molecular markers such as CDKN2A delection, along with a 9p21 delection, are also useful in evaluating the potential of meningioma recurrence and/or metastasize (9, 10). Malignant meningioma has an incidence of metastasis approximately 43% (11). The most frequent site of metastasis is the chest with a prevalence of lung (60%), pleura (9%) and mediastinum (5%) followed for frequency in the liver, lymph-nodes and bone (12). In the presence of metastasis, the survival of these patients is poor, with a median survival time shorter than 2 years after primary diagnosis (12).

Our case was unusual because it was a malignant meningioma which locally relapsed and became lung and bone metastases developed simultaneously. Factors in our case that suggested the ability to metastatize include: previous intracranial surgery, local recurrence, dural venous sinus invasion and malignant histological grading. It is possible that meningioma can metastasize to the lung and bone by microembolization, since most meningiomas arise from the arachnoid cells packing the arachnoid villi (13).

There is no standard treatment for the cure of metastatic meningioma. According to the scarce literature regarding the disease, chemotherapy is the only option in the case of multiple metastatic sites, and to date there are no

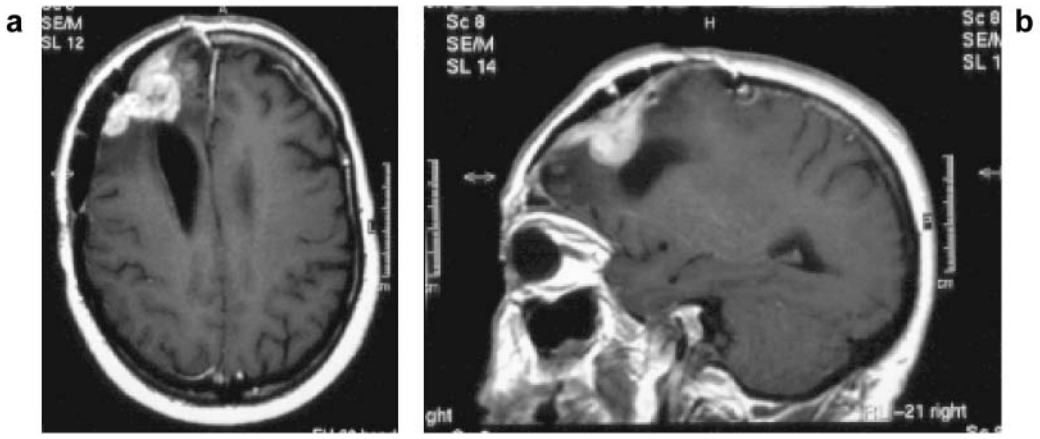

Figure 3. *MR SE T1 sequences after Gd-DTPA infusion in axial (a) and sagittal (b) planes after 6 months. MR shows an area with enhancement in the site of the surgery corresponding to relapse.*

particularly sensitive drugs for this disease. As with mesenchimal tumors, the treatment should include anthracyclines and alkylating agents (14, 15). There have been no cases reported regarding results of chemotherapy for malignant meningioma and, therefore, the activity and efficacy of systemic treatments are unknown. However, biological aggressiveness renders the malignant meningioma resistant to the drugs as shown by our case.

In a patient with a history of meningioma, expecially with local recurrence, a possible metastatic meningioma must be considered in the case of lung nodules or bone lesions. We recommend total body CT scan as a standard extracranial examination. For an effective therapeutic strategy, novel chemotherapy regimens should be explored.

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Received April 11, 2006
Revised June 26, 2006
Accepted July 3, 2006