Pulmonary Metastatic Meningioma with Coincident Lung Cancer: a case report

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ABSTRACT

Meningiomas with distant metastases rarely occur. We report a patient with coincident primary lung cancer and metastatic meningiomas. The presence of distinct imaging features and a differential response to chemotherapy enabled us to distinguish the primary lung cancer from the metastatic lesions. Previous studies suggest that several factors can enhance the propensity of meningioma for metastasis. Thus, if a patient presents with multiple lung nodules and a history of meningioma with certain predisposing factors, metastatic meningioma should be considered in the differential diagnosis.

CASE REPORT

A 48-year-old man was admitted to our institution because of the presence of a non-productive cough that had lasted for more than 3 months. The cough occurred intermittently, without any apparent predisposing factors. In addition, mild weight loss of approximately 3 kg within the previous 3 months was reported. His medical history consisted of hypertension, heavy smoking for more than 20 years, and post-surgical resection of an intracranial meningioma over 10 years previously. He denied having chest pain, shortness of breath, sensation of postnasal drip, or dyspepsia.

A chest radiograph revealed a mass-like opacity in the left upper lung field and an accessory nodular opacity adjacent to the mass. Subsequent computed tomography (CT) revealed a tumor with necrotic appearance in the left upper lobe, approximately 4 cm in diameter. In addition, there were several small nodules in the left lung, and a soft tissue mass in the paraesophageal region (Fig. 1). Sputum cytology revealed squamous cell carcinoma.

During the staging workup for the lung cancer, brain MRI was performed, and it revealed a dural-based, heterogeneous enhanced mass over the right high parietal region, with superior sagittal sinus invasion (Fig. 2). In addition, a skull defect with focal encephalomalacia of the adjacent brain tissue over the left parietal region was noted, suggesting post-operative changes caused by the previous meningioma surgery.

The patient underwent surgical resection of the brain tumor. The pathology report indicated that the tumor was a meningioma, and had a Ki-67 proliferative index less...
Pulmonary metastatic meningioma with lung cancer

than 5%. Therefore, the primary diagnosis was lung cancer with separated tumor nodules in the ipsilateral lung, and paraesophageal metastasis. Chemotherapy for lung cancer was initiated.

On the follow-up chest CT scan taken 6 months later, the main tumor in the left upper lobe had significantly regressed, but the other tumor nodules and the paraesophageal soft tissue mass were still in a stationary status. Positron emission tomography-computed tomography (PET-CT) showed FDG uptake by the residual main tumor, but not by adjacent pulmonary nodules or the paraesophageal mass. On MRI, the paraesophageal mass was shown to have similar signal intensity to the muscle tissues as observed on T1-weighted images, slightly hyperintense on T2-weighted images; it showed homogeneous enhancement and high signal intensity on diffusion-weighted images (Fig. 3).

The patient then underwent surgical resection of all the tumor masses and nodules. The pathology report indicated that the residual main tumor was indeed squamous cell carcinoma, while the other lung nodules and the paraesophageal mass were all metastatic meningioma. The patient’s post-surgical recovery went well, and there was no obvious recurrent tumor found during the course of a 2-year follow-up period.
Pulmonary metastatic meningioma with lung cancer

Discussion

Meningiomas represent 14% to 19% of all intracranial and intraspinal neoplasms [1]. Despite their frequency, distant metastases are rare and have been estimated to occur in 0.1% of patients. The most frequent sites of meningioma metastasis are the lungs (60%); followed by the abdomen and liver (34%); cervical lymph nodes (18%); long bones, pelvis, and skull (11%); pleura (9%); vertebrae (7%); central nervous system (7%); and mediastinum (5%) [1].

A possible mechanism for meningioma metastasis is via the blood through venous channels [1]. Therefore, meningiomas with dural venous sinus invasion or prior intracranial surgery are predisposing factors of metastatic disease. Indeed, the patient reported here had undergone intracranial surgery for meningioma 20 years prior to this hospital visit, and the recurrent meningioma did have superior sagittal sinus invasion.

The relationship between local tumor aggressiveness and the presence of distant metastases is not clear. Studies suggest that meningiomas which are histologically high-grade or with a high Ki-67 index on immunohistochemical staining, which indicates higher proliferative activity, increase the incidence of local recurrence and distant metastasis [3]. However, other studies show metastases occurs in tumors with a “benign” histology or subtype. That means the clinical manifestations of meningiomas do not always correlate with the histological features [2]. The patient presented in this case had histologic grade I meningioma, with a low Ki-67 index, but with multiple metastatic tumors in his lung.

FDG uptake by meningiomas is correlated with the
level of cellular metabolism, which is further correlated to the aggressiveness of the tumor. Benign intracranial meningiomas have been reported to have a low FDG uptake, similar to that of the surrounding tissues [4]. Furthermore, there was a case report showing that histologic grade III sacral metastatic meningiomas had moderate hypermetabolism when examined by using FDG/PET-CT [5]. Our patient had histologic grade I intracranial meningioma, and pulmonary metastatic meningioma with low cellular metabolism. Therefore, the different metabolic status between the residual primary lung cancer, which was hypermetabolic, and metastatic meningiomas was helpful in distinguishing them.

The diagnostic features of metastatic meningioma determined by using MRI have not been established. A previous case report described that the signal intensity characteristics of metastatic meningioma were similar to those observed in the primary intracranial lesion [6]. Typical benign intracranial meningiomas show isointense with the brain cortex on all sequences and reveal strong and homogenous enhancement after intravenous contrast medium administration. With regard to this patient, the metastatic tumor in the paraesophageal region had similar signal intensities to that of the intracranial meningioma.

In summary, because of the differential response to chemotherapy and imaging features, we could distinguish the primary lung cancer from the metastatic lesions. Therefore, we recommend that when a patient has multiple lung nodules and a history of meningioma with certain predisposing factors, metastatic meningioma should be considered as a differential diagnosis.

REFERENCES