

Multiple pulmonary metastases from intracranial meningioma: MR imaging findings

Ensar Yekeler, Memduh Dursun, Dilek Yılmazbayhan, Atadan Tunacı

ABSTRACT

Extracranial metastases from meningioma are very rare and among those the lungs are the most common metastatic site. In the literature, pulmonary metastases of meningiomas have been emphasized on their rarity, non-specific imaging findings, and cytologic features. Some definitive MR imaging features of intracranial meningiomas have been described. However, MR imaging findings of the lung metastases of meningiomas have not been investigated with regard to these diagnostic imaging features. In this report, similarities between MR imaging features of primary intracranial meningioma and its rare lung metastases are presented.

Key words: • meningioma • metastasis • lung
• magnetic resonance imaging

Meningioma is one of the most frequently encountered tumors of the central nervous system consisting of meningoepithelial cells and it generally originates from intracranial meninges (1). Metastatic meningioma is quite rare and lung is the most frequent site for metastasis (2, 3). Histopathological diagnosis of metastatic meningioma is difficult (4).

Although MR imaging findings of intracranial meningioma are very well known, MR imaging findings pertaining to lung metastases have not been reported. Until now, the literature on metastatic lung lesions of meningioma focuses on the facts that these lesions are rare, that they do not have specific imaging findings, and that the diagnoses should be established with fine needle aspiration biopsy (FNAB) under computed tomography (CT) guidance. In this case report, we investigated the similarities between the MR imaging features of the lung metastases of intracranial meningioma and those of the primary intracranial mass.

Case report

A 43-year old male patient was operated on for intracranial meningioma located in the right convexity. The patient was admitted with the complaint of bilateral chest pain on the second post-operative month. Lung x-ray revealed multiple nodular lesions on both lungs. Thoracic CT examination showed several lesions with regular borders on both lungs with the largest one having a diameter of 3 cm. The result of the histopathological examination performed on the FNAB specimen of the largest lesion was reported as metastatic meningioma. MR imaging was carried out to better characterize the imaging features of the lesions. All the lesions were isointense when compared to the muscle tissue on T1-weighted sequences, on T2-weighted images they were mildly hyperintense in comparison with the muscle. Some lesions had increased central T2 intensity, in line with their cystic-necrotic component. Other than this central T2 intensity, T1 and T2 signal features of the lesions were similar to that of the primary intracranial mass (Figure 1a-d). In three dimensional dynamic contrast T1-weighted gradient echo examination (3D-GRE), the lesions demonstrated progressively increasing contrast enhancement except for the cystic-necrotic component. Contrast enhancement features of the lung lesions were similar to those of the primary intracranial mass (Figure 1e, f). As the largest lesion diameter increased from 3 cm to 5 cm during one month follow-up period, thoracoscopic surgery was performed to verify the diagnosis reached by FNAB. Histopathological examination of the excised lesion verified the diagnosis of meningioma (Figure 2).

From the Departments of Radiology (E.Y. ✉, M.D., A.T.) and Pathology (D.Y.), Istanbul University Istanbul School of Medicine, Istanbul, Turkey.

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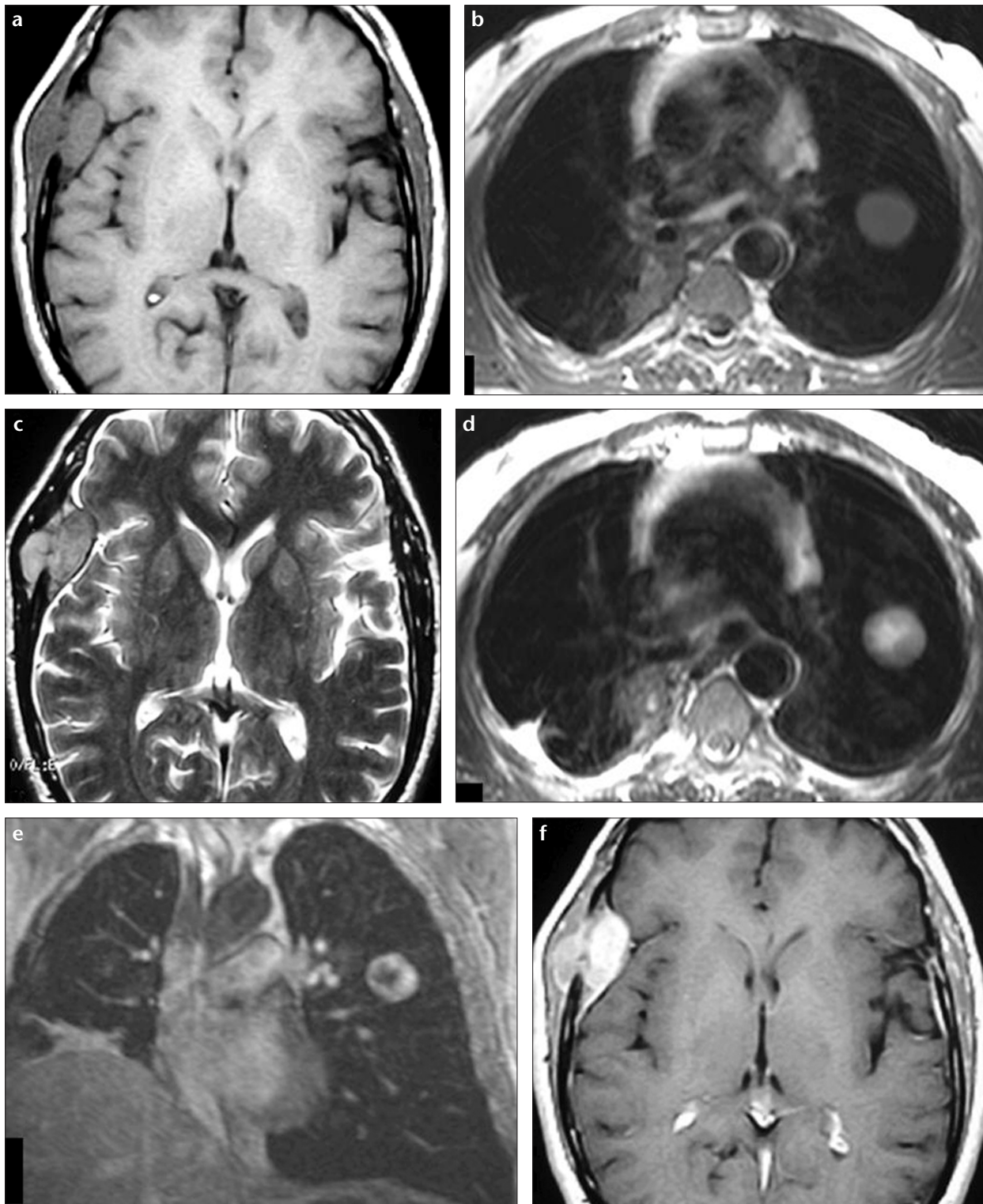


Figure 1. a- f. Transverse pre-contrast T1-weighted (a, b) and T2-weighted (c, d) MR images show that the primary intracranial mass and the metastatic lesion within the left lung have similar signal features with the cerebral cortex. Furthermore, a central cystic-necrotic component (d) is seen within the lung lesion. In coronal (e) and transverse (f) late-phase contrast-enhanced T1-weighted MR images, significant contrast enhancement of the metastatic lesion in the left lung and that of the primary intracranial mass are demonstrated.

Discussion

Meningioma is one of the most frequently observed intracranial tumors with a prevalence of 19% (5). Ex-

tracranial metastases of meningioma are quite rare (2). Lung is the most frequent site of metastasis with a frequency of 61% (6).

Some MR signal features that are specific to intracranial meningioma have been defined. Isointensity with cerebral cortex on T1-weighted and

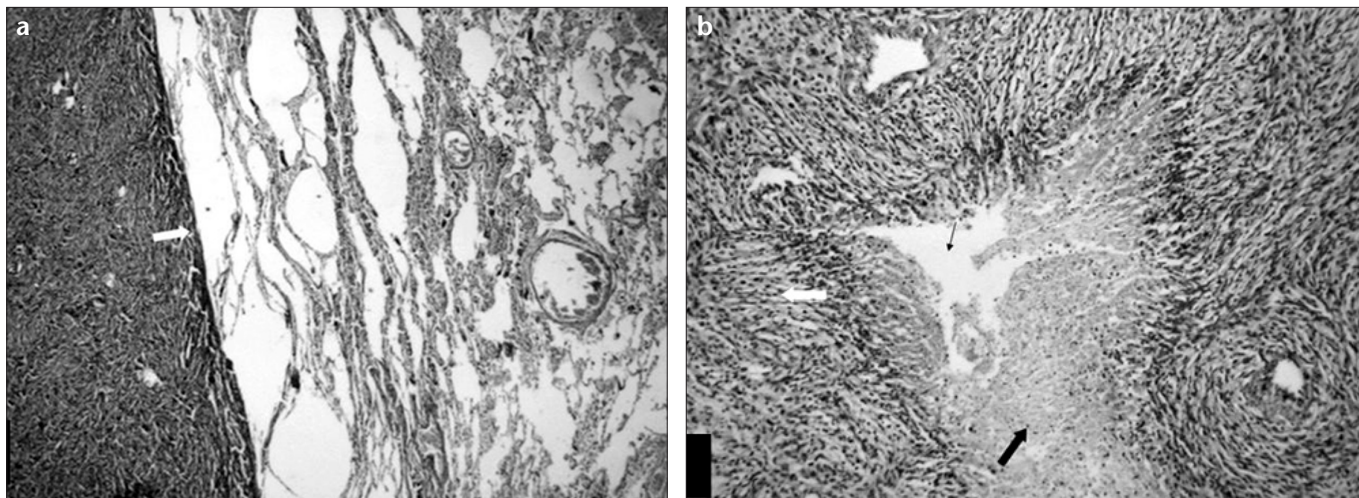


Figure 2. In histopathological examination, the clear boundary (a) (arrow) between the metastatic lung lesion (left side) and normal lung tissue (right side) is seen (HE, x32). In magnified view (b), central necrotic fields (bold black arrow), cystic fields (thin arrow), and tumoral cells (white arrow) are seen (HE, x125).

T2-weighted sequences are typical for meningiomas and are observed in more than half of the patients (7, 8). As far as we can derive from the current literature, no signal feature specific for metastatic meningioma has been described as has been defined for intracranial meningiomas. The metastatic lung lesions in our case had T1 and T2 signal characteristics that were similar to those observed in the primary intracranial lesion. The central cystic component observed in lung metastases of our case has not been previously reported. Cystic form has only been defined for intracranial meningioma. Naula et al. have classified intracranial meningiomas into four groups depending on the location of the cystic component they harbor (9): central intratumoral cyst; intratumoral cyst with peripheric location; peritumoral cyst in the neighboring parenchyma; peritumoral cyst between the tumor and the neighboring parenchyma; these can exist together. In our case, there was no cystic component within the intracranial mass; if the classification of this cystic form is also valid for metastatic lesions, then the central cystic lung metastases observed in our case can be classified under the first group.

In a series of 23 patients, Ikushima et al. have investigated the dynamic contrast enhancement pattern of intracranial meningiomas (10). Ac-

cording to this study, the lesions that were isointense with the cerebral cortex on T2-weighted MR imaging sequences showed progressively increasing enhancement at a rate of 87%. On the other hand, the lesions that were hyperintense on T2-weighted sequences had rapid contrast enhancement at the early phase. In line with the results of this study, both the intracranial primary mass and the lung metastases (excluding the cystic-necrotic component) were isointense on the T2-weighted MR imaging sequence in our patient and they all showed increasing contrast enhancement.

In conclusion, meningioma is a rare tumor creating difficulties in the histological diagnosis. Though this is the case of a patient with a history of intracranial meningioma, the similarities between the classical MR signal features of the intracranial mass and that of the identified metastatic lesion could be studied. The identification of similar signal features might be predictive for diagnosis, however for the validation of this observation, studies conducted on larger patient series are required.

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