Clinical Neuropathology image 6-2018: Metastasis of breast carcinoma to meningioma

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We report a case of a 33-year-old woman with history of stage IV breast cancer diagnosed at the age of 30 with metastasis to a meningioma. She presented with progressive headache and a gradual reduction of vision over the course of 10 days. MRI revealed multiple intracranial lesions suspicious of metastases. In two of them, the differential diagnosis with meningiomas was raised. One of the latter tumors compressed the optical nerves (right > left) and the optic chiasm, which indicated immediate microsurgical excision of the tumor. Neuropathological examination revealed two intimately connected neoplastic lesions. One lesion showed features of a meningotheliomatous meningioma, and within it, large epithelial, highly proliferating tumor nests were identified (Figure 1A). The epithelial nests showed strong nuclear immunoreactivity for GATA3 (Figure 1C), supporting an origin from the primary breast carcinoma [1]. In contrast, meningioma cells showed prominent nuclear immunoreaction for progesterone recep-

tor (Figure 1B) and remained negative for GATA3. The diagnosis of a metastasis of a breast carcinoma to a meningotheliomatous meningioma was made.

Tumor-to-tumor metastasis has been described before, although it presents a rather uncommon occurrence [1,2]. Meningiomas are the most common intracranial recipient tumors of tumor-to-tumor metastasis [2,3]. Breast and lung carcinomas are the most common origin of metastases to other tumors [1, 2, 4].

Different hypotheses to the pathogenesis of malignomas metastasizing into meningiomas have been proposed. First, a high percentage of meningiomas express progesterone receptors, as seen in the present case (Figure 1A), which could be a contributing factor to metastasis formation of breast cancer in meningioma [5]. In addition, the rich vascularization and the drainage by the dural sinus could facilitate hematogenous spread into the meningioma [1]. Moreover, the meningioma might provide an ideal environ-

Figure 1. A: Hematoxylin & Eosin stained section shows the two different neoplastic components. On the lower left part of the figure, parts of a meningioma with formation of whorls (asterisk), on the upper right part of the figure nests of an epithelial neoplasm. B: Strong nuclear immunoreactivity for progesterone-receptor in the meningioma (asterisk). C: Strong nuclear immunoreactivity of the metastasis for GATA3. Note the negative staining in the meningioma (asterisk and surroundings). All images magnification $\times 100$.

ment for other tumors to grow in, not only because of an ideal nutritional microenvironment, but also because of an altered immunological condition and a non-competitive setting due to the slow growth of the meningioma [4, 6]. And finally, the observation of a metastasis of a pulmonary carcinoma in the same localization where a meningioma had been removed 11 months earlier suggests that there might be other advantageous factors in the surroundings of meningiomas [7].

This case presents a special constellation of a patient with two different rare occurrences: a young age for suffering from breast cancer and the metastasis to a meningioma. Whether there is a common link between these two situations remains unclear, as well as the exact mechanisms involved in tumor-to-tumor metastasis. Further studies are needed to better characterize this phenomenon.

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Conflict of interest

The authors declare no conflict of interest.

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