Case Report

Metastatic Gallbladder Carcinoma in Meningioma: A Case Report

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ABSTRACT

Metastases from tumors to systemic cancers are rare. The most common intracranial recipient tumor is meningioma. Metastasis from gallbladder cancer has been previously reported from only one patient during autopsy. We present a case of a 72-year-old woman who underwent surgery for right frontal skull base meningioma. The tumor was completely removed. Histological specimens showed gallbladder carcinomatous metastasis with diffuse neuroendocrine differentiation in meningothelial meningioma. The Ki-67 proliferation index of the meningioma was 3%. Further, 60% positive immunoreactivity with the progesterone receptor was observed in meningioma cells. In carcinoma cells, diffuse positive immunoreactivity with chromogranin, CDX2, CEA, panCK, cytokeratin 7, and synaptophysin was observed. A combination of molecular, metabolic, immunological, and/or hormonal factors may contribute to the pathogenesis of this lesion. It cannot be ruled out that it is more common than expected.

KEYWORDS: Gallbladder carcinoma, Histopathological examination, Meningioma, Metastasis into meningioma

■ INTRODUCTION

Metastases to systemic cancers are rare in tumors (14). The most common intracranial recipient tumor is meningioma (4). Most common sources of metastases into meningiomas are breast and lung cancers; metastases from renal, thyroid, prostate, and colon cancers are very rare (1,13), and those from gallbladder cancer have been observed in tissue sections obtained during autopsy from one patient (11). Molecular, hemodynamic, hormonal, and metabolic hypotheses may explain intratumor metastasis; however, the main mechanism remains unclear.

We present a patient who underwent surgery for meningioma and was diagnosed with gallbladder carcinoma after histopathological examination.

■ CASE REPORT

A 72-year-old female patient presented to our clinic with numbness of the left side for a month. Neurological examination showed hemiparesis. She had a history of chronic hypertension and glaucoma and had undergone right nephrectomy for renal clear cell carcinoma 10 years previously. She was followed up by the medical oncology clinic for 5 years and showed no recurrence. Brain magnetic resonance imaging (MRI) performed 3 years previously showed no intracranial pathology. A new MRI revealed a 4.5×4×3.5-cm meningioma on the right frontal skull base (Figure 1). The tumor was completely removed. Her postoperative general condition was good; she was discharged on postoperative day 5 after normal neurological examination findings.

Surgical specimens were fixed in 10% formalin for light microscopy. Selected samples from case specimens were routinely embedded in paraffin, and 5-μm-thick sections were cut and stained using hematoxylin and eosin (H&E). Immunohistochemistry using specific antibodies was performed on paraffin-embedded tissue sections (Figure 2). Histological specimens showed gallbladder carcinomatous metastasis with diffuse neuroendocrine differentiation in meningothelial

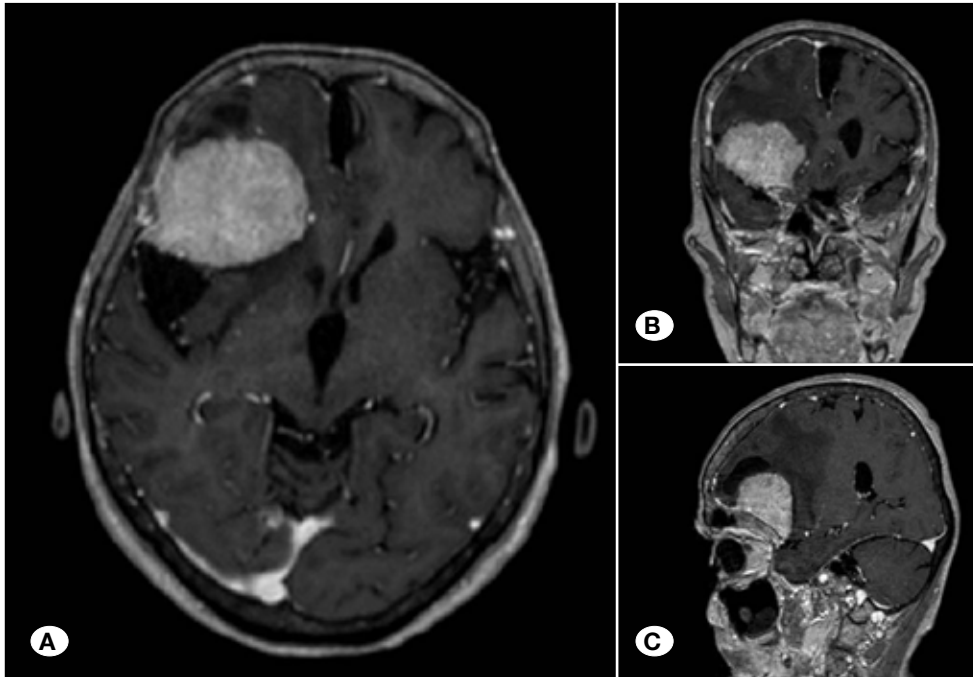**Corresponding author:** Burak EREN

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Figure 1: Axial **(A)**, coronal **(B)**, and sagittal **(C)** MRI T1 sections with contrast. Heterogeneous enhancement of 4.5×4×3.5 cm meningioma located on right frontal skull base was observed.
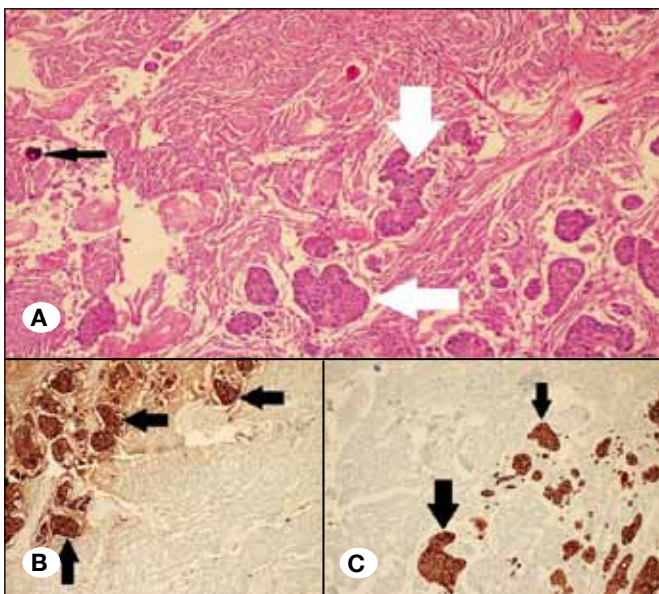

Figure 2: A) Psammomatous calcification (black arrow) on the left and carcinoma infiltration (white arrows) on the right and lower solid epithelial islands are seen in middle hyaline-like turbulence structures formed by meningothelial cells (H&E, ×100). **B)** Immunoreactivity (black arrows) was observed in the carcinoma areas (panCK, ×100). **C)** Immunoreactivity was observed in carcinoma cells (black arrows) (CEA, ×100).

meningioma. The Ki-67 proliferation index of the meningioma was 3%. Further, 60% positive immunoreactivity with the progesterone receptor was observed in meningioma cells. In carcinoma cells, diffuse positive immunoreactivity with chromogranin, CDX2, CEA, panCK, cytokeratin 7, and synapto-physin was observed. No staining was observed with CK20 and TTF-1.

One day before the pathological report, she presented to our hospital's emergency department with severe abdominal pain. Neurological examination findings were normal; no nuchal stiffness was observed. Brain computed tomography (CT) findings were normal. No neurosurgical pathology was found to explain her condition. She had acute abdominal findings. Her condition deteriorated following radiological examinations, and she developed sudden cardiac arrest. She did not respond to resuscitation. One day later, she was diagnosed with gallbladder cancer. Preoperative abdominal CT images were reviewed, and a new mass was observed on the gallbladder.

■ **DISCUSSION**

Tumor-to-tumor metastasis is rare and was first described in 1930 (5). Among all benign tumors, meningiomas have the highest rate of metastasis from primary tumors (6). All reported intrameningioma metastases are associated with intracranial meningioma, except for a few cases of spinal meningioma (10,13). The most common metastatic sources are breast and lung carcinomas (4). Other malignancies exceptionally metastasize into meningiomas (e.g., renal, genitourinary, gastrointestinal, prostate, and parotid tumors and lymphoma) (12). Meningiomas such as breast cancers are twice as common in women than in men and occur at 50–60 years of age (4). Meningiomas are highly vascular tumors that sensitize hematological metastases. High collagen and lipid contents can be suitable for the growth of other tumors (15).

Tumorigenic factors such as mutation or deletion of tumor suppressor genes may fall under the association and/or affinities

between metastatic breast carcinoma and meningioma. Also in meningioma patients, a depressive systemic cellular immune response may weaken the host's surveillance of metastasis (9). The presence of three tumors (renal clear cell carcinoma, meningioma, and gallbladder carcinoma) may support the hypothesis that tumorigenic factors were present in our patient. Hormonal factors may cause meningioma metastasis of breast carcinoma. Meningiomas have 83% progesterone and 9% estrogen receptors (7). Our patient had 60% positive immunoreactivity with the progesterone receptor.

Correct diagnosis of lesions before surgical removal and histological examination of meningiomas is almost impossible (2). Routine brain imaging with CT and MRI cannot exclude intrameningiomatous metastasis; hence, physiologically based brain imaging methods such as magnetic resonance spectroscopy (sMRI) and perfusion MRI (pMRI) have been proposed (4). The ratio of colin/creatinine in the sMRI can indicate the proliferative or malignant potential of meningioma, as well as the lactate/lipid peak associated with intratumoral necrosis (9). Watanabe et al.(15) reported a case of breast cancer metastasis into a frontal parasagittal meningioma. Preoperative sMRI suggested the malignant nature of the tumor. However, definitive diagnosis was provided by histology.

Although meningiomas show characteristic findings, a faster than expected growth suggests that they may originate from metastatic disease (3). A study (8) correlating meningioma growth with histology showed a mean doubling time of 415 days (range, 138–1045 days) in benign, 178 days (34–551 days) in atypical, and 205 days (30–472 days) in anaplastic meningiomas. Brain MRI of our patient obtained 3 years previously did not show a tumor, but the appearance of a 4-cm tumor in the new MRI suggested a short doubling time. Although the meningioma was histologically grade I, hypointense areas within the tumor were observed in MRI findings. Tumor-to-tumor metastasis may be suspected in meningiomas that are not homogeneous on MRI and have a short doubling time, as in our case.

Metastasis to meningiomas may clinically and histopatho-logically mimic metastatic disease. Generally, these patients present with meningioma-related complaints rather than with metastatic cancer findings. Clinically, various signs and symptoms may occur (13). Our patient was referred with hemiparesis.

The clinical significance and prognostic implication of this pathological condition are uncertain. Future investigations should clarify whether death is mainly due to meningioma or metastatic primary cancer. We believe that our patient died of gallbladder cancer, but it was not diagnosed because she did not undergo an autopsy.

■ CONCLUSION

Most metastases are incidentally recorded during an operation or autopsy. A combination of molecular, metabolic, immunological, and/or hormonal factors may contribute to the pathogenesis of this lesion. It cannot be ruled out that this phenomenon is more common than expected.

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