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Case Report

Pituitary Metastasis of Breast Cancer: A Case Report

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SUMMARY

Metastasis to the pituitary gland is an unusual situation in clinical practice and is typically observed only in elderly patients, but its incidence is increasing because of the increased survival of patients with cancer. In most cases, such metastasis is found in patients aged 60–70 years, who usually present with various non-specific symptoms. The most common primary sites are breasts in women and lungs in men. The prognosis of patients with breast cancer metastasis is poor but it depends on the primary neoplastic extension. We report a case of a 63-year-old woman with a history of bilateral breast cancer with surgery 15 years ago on the left side and 8 years ago on the right side. A pituitary macroadenoma was first suspected because of a visual disturbance for months before a magnetic resonance imaging examination. The patient underwent resection of the pituitary tumor by endoscopic transnasal *trans*-sphenoidal surgery. The final histopathological and immunohistochemistry analysis confirmed a pituitary metastasis of breast mucinous carcinoma. Postoperative follow-up continued for 2.5 half years, and the subsequent clinical imaging studies did not show local recurrence of the primary malignancy. She is currently disease free and has a good performance status.

1. Introduction

Pituitary gland adenoma accounts for 5–20% of all central nervous system tumors in the adult population.[1] The percentage of pituitary tumors that are benign and primary carcinoma only account for 0.1–0.2% of all cases.[2] Metastasis to the pituitary gland is unusual. Among all pituitary tumor resections, only approximately 1% are found to be metastatic tumors.[3] Therefore, the pituitary gland is not a common site of metastasis. In previous autopsy series studies, pituitary metastases were found in 1–3.6% of patients with malignant tumors.[4] However, the incidence of pituitary metastases is increasing in recent years owing to the increased survival of patients with cancer.[5] Pituitary metastases occur most commonly in the elderly, especially those aged 60–70 years.[3] In this article, we report a rare case of pituitary metastasis from breast cancer, without clinical evidence of local recurrence of the primary malignancy.

2. Case report

A 63-year-old woman was admitted to The Mackey Memorial Hospital in October 2013, complaining of months of blurred vision and visual field disturbances. Her past personal history included invasive mucinous carcinoma of the left breast diagnosed 15 years ago, treated with left mastectomy, axillary dissection, and adjuvant chemotherapy. She had also been diagnosed with cancer in her right breast 8 years ago and received a similar treatment course.

The visual field examination confirmed bilateral temporal hemianopia. A subsequent cranial magnetic resonance imaging (MRI) scan displayed a lobulated tumor approximately 2.3 × 3.3 × 4.2 cm involving the pituitary fossa with suprasellar extension, compression of the optic chiasma, and inferior extension, destroying the sellar floor to the sphenoid sinus (Fig. 1A and B).

Initial laboratory tests showed a normal blood count, blood glucose level: 108 mg/dL, Na: 143 mmol/L (reference value [RV]: 136–145), K: 4.0 mmol/L (RV: 3.5–5.1), and creatinine: 0.7 mg/dL (RV: 0.4–1.2). Hormonal evaluation revealed hypogonadotropism (Table 1).

The patient underwent endoscopic transnasal *trans*-sphenoidal surgery with resection of the mass. Intraoperative frozen biopsy

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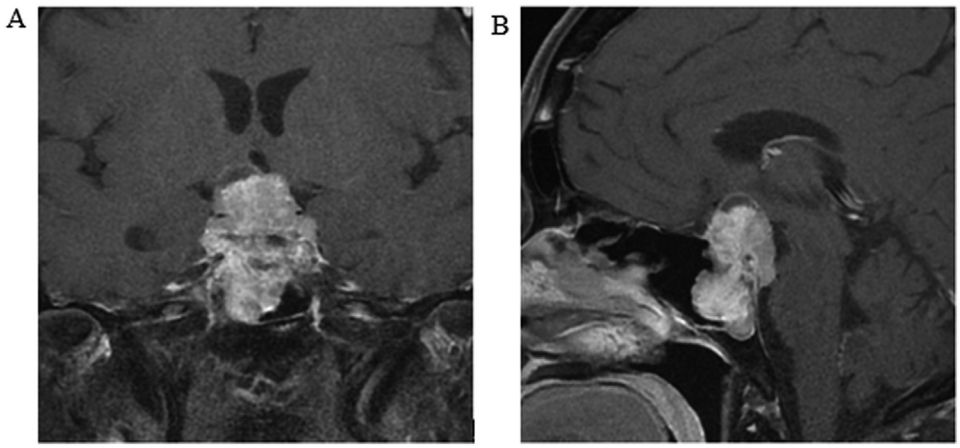

Fig. 1. Magnetic resonance imaging (MRI), T1-weighted with gadolinium enhancement, revealing the pituitary tumor. (A) Coronal section expansive formation in the sellar region, infrasellar and suprasellar with intense enhancement inside (B) Sagittal section: extension and destructing the sellar floor into the sphenoid sinus.

Table 1
Initial hormonal evaluation.

Hormone (unit)	Result	Reference
LH (mUI/mL)	5.48	10.8–61.4
FSH (mUI/mL)	25.47	35–151
PRL (ng/mL)	13.47	2–13
HGH (ng/mL)	0.09	<10.7
ACTH (pg/mL)	24.70	5.00–77.00
CORTISOL (μg/dL)	9.41	4.75–23.27
T4 (μg/dL)	9.75	4.50–12.00
T3 (ng/dL)	125.33	78.00–182.00
TSH (μUI/mL)	0.77	0.25–4.00

LH: luteinizing hormone, FSH: follicle-stimulating hormone, PRL: prolactin, HGH: human growth hormone, ACTH: adrenocorticotropic hormone, T3: triiodothyronine, T4: thyroxine, TSH: thyroid - stimulating hormone.

showed a pituitary gland adenoma. The histopathological analysis was consistent with metastatic mucinous carcinoma and the immunohistochemistry results were positive for cytokeratin-7, cytokeratin 20, estrogen receptor, progesterone receptor, and partially positive for 15 kD gross cystic disease fluid protein. The Ki-67 proliferation index was 16% (Fig. 2).

Routine postoperative care was unremarkable. Transient diabetes insipidus occurred and rapidly recovered after hormone replacement. The patient improved clinically and experienced a gradual restoration of her ophthalmological disturbances. Adjuvant chemotherapy with letrozole 2.5 mg/day was prescribed. Local volumetric modulated arc therapy/intensity modulation radiation therapy was prescribed with a total dose of 54 Gy in 30 fractions. An 18F-fluorodeoxyglucose (18F-FDG) positron emission tomography scan was performed to detect other metastatic lesions but identified no obviously abnormal radiotracer uptake. Postoperative MRI demonstrated a gross total resection (Fig. 3A and B). Currently, at 32 months postsurgery, the patient is without clinical evidence of local recurrence of the primary malignancy.

3. Discussion

Pituitary adenoma is the most common cause of pituitary masses, constituting approximately 10% of all intracranial

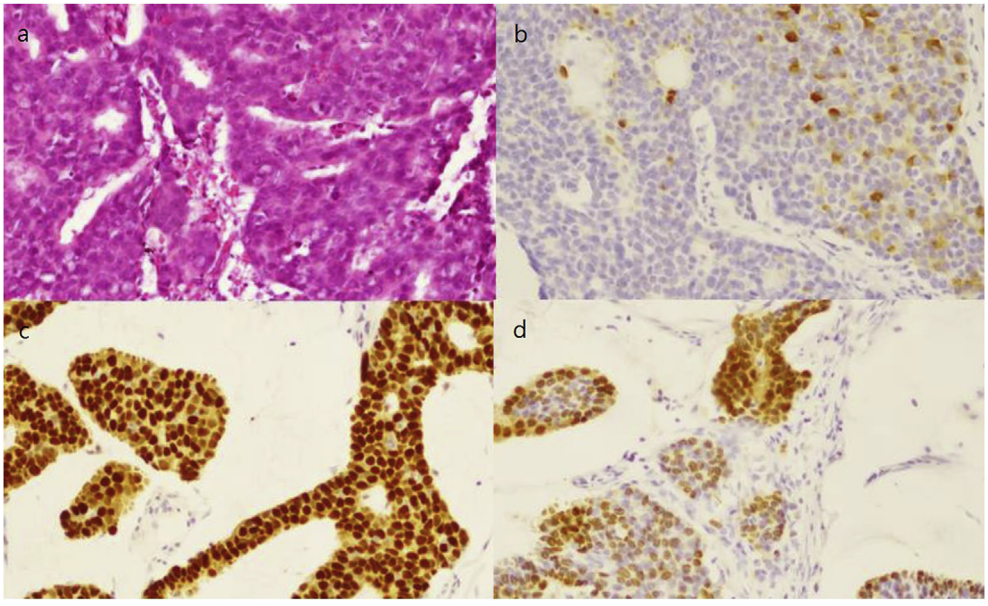

Fig. 2. Histological tumor specimens (magnification×100). (a) Hematoxylin and eosin staining of the pituitary metastatic tumor, clusters of small uniform cells floating in lakes of extracellular mucin. Immunohistochemical expression of (b) GCDFP 15 (focal positive), (c) ER, and (d) PR.

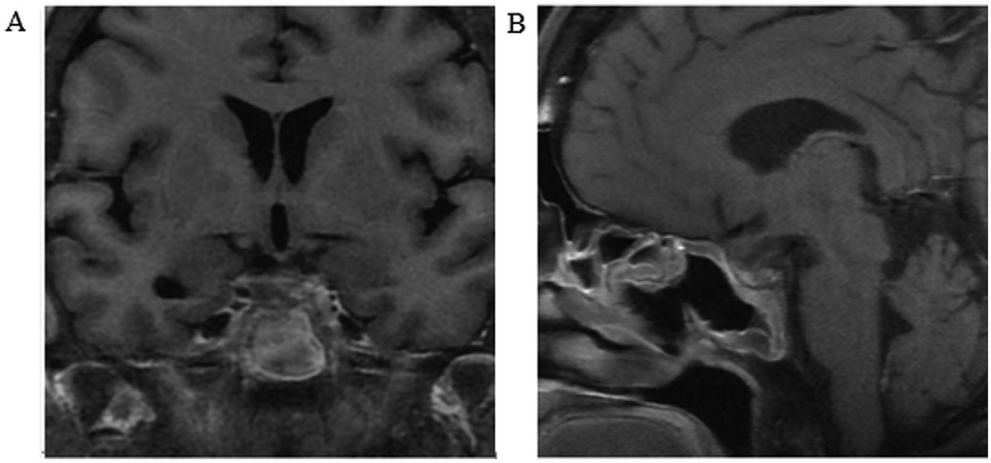

Fig. 3. Magnetic resonance imaging (MRI), T1-weighted with gadolinium enhancement. Postoperative follow up. (A) Coronal section (B) Sagittal section: mucosal thickening in sphenoid sinus. No abnormal signal intensity or enhancement is noted in sella turcica.

neoplasms. Pituitary gland metastasis accounts for only approximately 1% of all pituitary tumors in previous serial studies.[6] Breast tumors and lung tumors are the most common primary sites of malignant metastases to the pituitary gland, but other sites such as the gastrointestinal tract, prostate, kidney, thyroid, and pancreas have also been reported.[7] Morita et al. reported metastases from breast cancer accounted for 33% of pituitary metastases and those from the lung accounted for 36% in 36 clinically symptomatic patients.[8]

Most pituitary metastases are clinically silent and only 18% have various non-specific symptoms.[9] The most common presentations include diabetes insipidus, visual field defects, hypopituitarism, and ophthalmoplegia. Laboratory tests may present hypogonadotropism, thyroid hormone, cortisol, and adrenocorticotropic hormone insufficiencies.[10] Peppa et al. described many features that could be mistaken as cancer cachexia, including fatigue, weight loss, dizziness, nausea, and vomiting.[11] Diabetes insipidus is much more common in cases of pituitary metastases than in pituitary adenoma. Nearly 70% of symptomatic patients with pituitary metastases present with diabetes insipidus, whereas the rate of diabetes insipidus in patients with pituitary adenomas is less than 1%.[12] This can be used for differentiating pituitary adenoma from pituitary metastases. However, in our case, after a pituitary metastasis was confirmed, diabetes insipidus was not observed during the clinical course.

There are many potential differential diagnoses for intrasellar tumors, including adenomas, craniopharyngiomas, Rathke's cleft cysts, or aneurysms. The radiographic findings are usually nonspecific for pituitary metastases. In MRI studies, isointense or hypointense sellar masses on T1 and hyperintense masses on T2 with homogeneous enhancement after gadolinium are common features.[3] Imaging studies may be helpful for distinguishing metastatic disease when thickening of the pituitary stalk, invasion of the cavernous sinus, rapid growth, and sclerosis of the surrounding sella turcica are visible.[13] However, there were no such discriminative characterizations observed in our patient.

Options for management of pituitary metastases include surgical resection, radiotherapy, chemotherapy, and endocrine therapy. Radiotherapy and chemotherapy are suggested as initial options for patients with multifocal metastases. They could be combined with endocrine therapy for relief of symptoms. Surgical exploration and decompression could provide benefits and local control by reducing the mass volume. Surgery followed by a pathologic diagnosis could be established in patients with metastases of uncertain origin.[14] It also provides relief of symptoms related to mass effects such as visual field defects and ophthalmoplegia.

Previous series reported a poor prognosis in patients with pituitary metastases. Ntyonga-Pono et al. reported the 1-year survival rate was less than 10% and the longest survival was 3 years after diagnosis.[15] Better outcomes are predicted if the pituitary gland is the only site of metastasis. Worse outcomes could be expected in cases of a relatively younger age at diagnosis (younger than 65 years old), a short interval (less than 1 year) between the initial cancer and pituitary invasion, pituitary stalk invasion, or with small-cell lung carcinoma as the primary malignancy.[16]

Our patient did not have the remarked presentations as other cases of pituitary metastasis: diabetes insipidus, or discriminative radiographic findings. Yet the old age and history of breast cancer remind us the possibility of distal metastasis to pituitary gland. She also had some distinctive features: the lengthy interval between pituitary invasion and initial pathologic diagnosis, the presence of a solitary metastasis of breast cancer to the pituitary gland, and persistent disease-free survival after complete resection of the pituitary lesion. All of the above suggest a good prognosis.

Disclosure

The authors declare no conflicts of interest.

Acknowledgments

None.

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