Diabetes insipidus due to pituitary metastasis in a woman with lung adenocarcinoma: a case report

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Abstract: Metastatic tumors of the pituitary are uncommon and usually asymptomatic. They are often incidental findings from imaging workups for other medical issues or from the assessment of primary tumors in other locations. Diabetes insipidus is the most common symptom resulting from pituitary tumors, including pituitary metastases. A 56-year-old woman with primary lung adenocarcinoma underwent video-assisted thoracic lobectomy. Regular follow-up was unremarkable until 15 months after surgery, when she presented with polyuria and polydipsia suggestive of diabetes insipidus. A pituitary mass was found on brain magnetic resonance imaging; the diagnosis of lung adenocarcinoma metastasized to the pituitary was confirmed by trans-sphenoidal surgery and biopsy of the pituitary mass. Diabetes insipidus and hormonal profiles are the key to recognize the existence of pituitary metastases, and patients with primary lung cancers presenting with diabetes insipidus should be evaluated for pituitary metastases.

Keywords: Pituitary tumor • Metastasis • Lung cancer • Diabetes insipidus

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1. Introduction

Although tumors metastasized to the pituitary gland are unusual, certain types of primary tumors are associated with spread to the pituitary more frequently [1]. Breast and lung cancers are the most common primary malignant neoplasms that metastasize to the pituitary gland [2]. Most pituitary metastases are asymptomatic and typically detected incidentally on imaging [3]. However, diabetes insipidus is the most common symptom in the few symptomatic pituitary metastases [4] and can raise suspicion of the existence of metastatic pituitary involvement. The purpose of this report is to describe a rare case of an elderly woman with early stage lung cancer who presented with diabetes insipidus 15 months after removal of the primary tumor.

2. Case Report

A 56-year-old postmenopausal woman presented with progressive polydipsia and polyuria occurring for the past three months. She had no history of diabetes mellitus or hypertension, and was a nonsmoker. Fifteen months previously, the patient underwent video-assisted thoracic lobectomy of the right middle lobe and right lower lobe to remove primary lung adenocarcinomas. Two months before the current admission, she developed insomnia
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Associated with nocturia. Her daily volume of urine ranged from four to six liters, and she reported being thirsty regardless of markedly increased fluid intake.

The patient was 155 cm in height and 40 kg in weight upon presentation at the clinic, with body temperature of 37 degrees Celsius, blood pressure reading of 117/83 mmHg, and pulse rate 92/min with a regular rhythm. The findings on physical examination were unremarkable, including respiratory and neurological examinations. Initial evaluation of complete blood count revealed white blood cell count 4,800 /µl, hemoglobin 13 g/dl, and platelet count 18.4 x 10^4/µl. Serum electrolytes, liver function tests, and renal function tests were normal. Carcinoembryonic antigen values were 5.21 ng/ml. Notably, the urine specific gravity was 1.004 g/ml (normal 1.01–1.03 g/ml). Central diabetes insipidus was diagnosed by a water deprivation test. Hormonal profiles revealed serum prolactin 97.95 ng/ml (normal 4.79 – 23.3 ng/ml), growth hormone 0.684 ng/ml (normal 0.01 – 3.61 ng/ml), follicle-stimulating hormone 2.94 mIU/ml (normal in postmenopausal 25.8 – 134.8 mIU/ml), luteinizing hormone 0.1 mIU/ml (normal in postmenopausal 7.7 – 58.5 mIU/ml), estradiol 15 pg/ml (normal in postmenopausal < 54.7 pg/ml), adrenocorticotrophic hormone 9.9 pg/ml (normal 9 – 46 pg/ml), free T4 0.55 ng/dl (normal 0.93 – 1.7 ng/dl), T3 0.53 ng/ml (normal 0.8 – 2 ng/ml), and thyroid-stimulating hormone 3.64 µU/ml (normal 0.27 – 4.2 µU/ml).

The chest roentgenogram revealed the expected postoperative reduction in volume of the right lung and the elevation of right hemidiaphragm. Computed tomography of the chest revealed no tumor recurrence. Magnetic resonance imaging of the brain showed a heterogeneously enhancing mass in the pituitary gland and an enlarged pituitary stalk with thickened and enhancing of the infundibulum of the third ventricle (Figure 1). 99mTC MDP whole body bone scan revealed no definite evidence of bony metastases.

The patient underwent trans-sphenoidal surgery with pituitary gland tumor biopsy. The biopsy specimen measuring, 7 x 7 x 2 mm in aggregate, was submitted for histopathological examination, which revealed an adenocarcinoma composed of pleomorphic and hyperchromatic tumor cells arranged in glandular pattern with infiltrative growth. These tumor cells were strongly immunoreactive for thyroid transcription factor-1 (B, x200) and cytokeratin 7 (C, x200), but negative for cytokeratin 20 (D, x200).

This finding was consistent with that of metastatic adenocarcinoma originating from lung. After biopsy, the patient was referred for radiation therapy targeting the pituitary metastases. She received whole brain radiation therapy of 3000 cGy in 15 fractions followed by pituitary boost radiation in the form of volumetric-modulated arc therapy (3200 cGy in 16 fractions) as shown in Figure 3. Her condition was stable during follow-up; the patient will receive further cisplatin based chemotherapy.

Figure 1. A, Pre-contrast axial MRI T1WI. B, Post-contrast axial MRI T1WI. C, Post-contrast coronal MRI T1WI. D, Post-contrast sagittal MRI T1WI showing heterogeneous enhancing pituitary mass with suprasellar extension.

Figure 2. Photomicrographs showing the histological features of adenocarcinoma composed of pleomorphic and hyperchromatic tumor cells arranged in glandular pattern with infiltrative growth (A, hematoxylin-eosin stain, x400). These tumor cells were strongly immunoreactive for thyroid transcription factor-1 (B, x200) and cytokeratin 7 (C, x200), but negative for cytokeratin 20 (D, x200).