Case report

A 43-year-old female visited a local hospital in July 2003 because of a 2-month history of a painless mass in her right cervical area. She had no family history of paraganglioma. Magnetic resonance imaging of her head and neck revealed an enhanced mass near the right carotid body (Figure 1). She underwent surgery for the removal of the mass, which was histologically diagnosed as a carotid body paraganglioma. As a postoperative complication, she developed a cerebral infarction in the right internal carotid artery area and suffered from left-sided hemiplegia. Two years later, small pulmonary nodules in both lungs were detected by a routine chest X-ray examination. After careful follow-up for five years, Computed Tomography (CT) guided needle biopsy was performed, which revealed that the pulmonary nodules were metastases from the carotid body paraganglioma. Long-term follow-up is recommended for paragangliomas, since metastasis or local recurrence has been difficult to predict accurately using only histological evidence.

Key words: paraganglioma, pulmonary metastasis, carotid body

Introduction

Paragangliomas are rare neuroendocrine tumors arising from extraadrenal paragangliar chief cells. Most of these tumors originate from the paraganglia in the head and neck, retroperitoneum, and bladder. Although paragangliomas are generally considered to be histologically benign, a small percentage of these tumors lead to distant metastases. Whether or not these tumors eventually cause distant metastases cannot be predicted based on the histological features of the primary tumor, because histological features including nuclear pleomorphism, atypia, and mitotic activity are not considered as definite signs of malignancy in paraganglioma.

It has been suggested that malignant paragangliomas should be defined by the presence of distant metastasis. The most common sites of metastasis are the lungs, liver, and bone. These distant metastases have been radiologically diagnosed in most cases. Therefore, there are few cases whose distant metastases were histologically proved. We herein report a case of a right carotid body paraganglioma accompanied with pulmonary metastases, which were histologically confirmed after five-year follow-up.

Case presentation

A 43-year-old female visited a local hospital in July 2003 because of a 2-months history of a painless mass in her right cervical area. She had no family history of paraganglioma. Magnetic resonance imaging of her head and neck revealed an enhanced mass near the right carotid body. She underwent surgery for the removal of the mass, which was histologically diagnosed as a carotid body paraganglioma. As a postoperative complication, she developed a cerebral infarction in the right internal carotid artery area and suffered from left-sided hemiplegia. Two years later, small pulmonary nodules in both lungs were detected by a routine chest X-ray examination. Thereafter, she was transferred to our hospital for further evaluation and treatment.

Physical examination revealed no abnormalities except for dysphagia, left facial palsy, and left limb weakness due to the cerebral infarction. Laborato-
ry findings and culture examination revealed no evidence of infection. Chest X-rays and Computed Tomography (CT) demonstrated multiple small nodular lesions, varying in size from several millimetres to 10 mm, with round and clear borders, scattered throughout the bilateral pulmonary fields (Figure-2A). Fluorine-18 fluorodeoxyglucose-positron emission tomography showed abnormal uptake in the regions of the pulmonary nodules, with a maximal standardized uptake value (SUV) of 5-10. Informed consent to perform a lung biopsy was not obtained at that time, so a histological diagnosis of the pulmonary nodules could not be made. Five years later, the pulmonary nodules had progressively increased in size (Figure-2A, B, C). After obtaining informed consent, a CT guided needle lung biopsy was performed in January 2010 to establish a histological diagnosis for the pulmonary nodules.

In the lung biopsy specimens, the tumors histologically formed well-defined nests of cuboidal cells with abundant eosinophilic cytoplasm, the so-called “Zellballen pattern” (Figure-3A). Immunohistochemically, the tumor was positive for both chromogranin A and synaptophysin (Figure-3B). These histological findings were similar to those of the right cervical mass resected in the previous hospital (Figure-3C, D). Therefore, the pulmonary nodules of the patient were histologically considered to be metastases from the right carotid body paraganglioma.

The patient was discharged 4 days after the biopsy. An abdominal recurrence appeared at her one-year check-up. The general condition of the patient has worsened, with nodules spreading through the lungs and liver. She refused systemic treatments and preferred to receive the best supportive care, and was finally transferred to a hospice unit for palliative care.

Discussion

Paraganglia are groups of cells that originate from the neural crest belonging to the extraadrenal chromaffin and non-chromaffin cell system. The paraganglia in the head and neck are commonly associated with the arterial vasculature and cranial nerves of the ontogenetic gill arches, and are believed to serve the function of chemoreception. Paragangliomas are tumors arising in the paraganglia, and may occur along the pathway of their embryologic migration that extends from the skull base to the aortic arch[1].

Paragangliomas of the head and neck are rare tumors, accounting for 0.012% of all head and neck tumors[10]. The carotid body is the most common site of occurrence for paraganglioma in the head and neck. Although the tumors generally are considered to be benign, previous findings suggest that a minority (<10%) of the carotid body paragangliomas exhibit local invasion and/or distant metastases, which are clinically reminiscent of malignant tumors[11].

It is difficult to predict whether a carotid body
paraganglioma is likely to invade and/or metastasize based on its histological features. Accordingly, malignant carotid body paraganglioma is defined as a tumor that metastasizes to lymph nodes and/or other organs. In our case, the pulmonary nodules were histologically confirmed to be metastases from the carotid paraganglioma. The most frequent site of metastases for paraganglioma is the local lymph nodes, followed by the lungs, liver, and skin. Lee et al reviewed a total of 59 cases of malignant paraganglioma of the head and neck from the National Cancer Data Base and found that 16 cases occurred in the carotid body. Among these, only one case was accompanied by distant disease.

According to Antakli’s report, multiple primary tumors with the same histological condition need to fulfill 2 or more of the following items: 1) anatomically distinct, 2) associated with a premalignant lesion, 3) no systemic metastases, 4) no mediastinal spread, 5) different DNA ploidy. Our case fulfilled 1), 3) and 4) in the definition of multiple primary tumors. Therefore, we could not completely exclude the possibility that both the carotid body paraganglioma and pulmonary nodules were metachronous multiple primary tumors. However, we still believe that the pulmonary nodules in our case were metastases from carotid body paraganglioma, because the patient presented with multiple pulmonary nodules, which are different from primary pulmonary paragangliomas usually showing solitary nodules.

For paragangliomas with distant metastases, chemotherapy has been reported to be largely unsuccessful. At present, no appropriate treatments for pulmonary metastases of paragangliomas have been identified. In the present case, the patient did not accept chemotherapy, and hoped to receive best supportive care.

Conclusions

We herein presented a unique case of carotid body paraganglioma with subsequent pulmonary metastases, which were histologically confirmed after five-year follow-up. Long-term follow-up is recommended since the time interval for local recurrences and distant metastasis can vary from months to years after the initial diagnosis.

References