



Clinical commentary

Metastases in cerebellopontine angle from the tumors of central nerve system



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ABSTRACT

The objective of this study was to analyze the characters of the cerebellopontine angle (CPA) metastases from central nerve system (CNS) tumors. Ten patients were reviewed for the period between 2008 and 2015. The clinical and neuroimaging features, and treatment outcomes were analyzed retrospectively. The average period during primary diagnosis through the diagnosis of CPA metastases was 42.4 months. Among the 10 cases, the primary tumors and metastases were found simultaneously in 3 cases, the metastases after primary tumor removal were found in 5 cases, and the metastases after stereotaxic radiosurgery were found in 2 cases. Only 4 patients presented with the symptoms and signs associated with CPA involving, one with hearing loss, one presenting facial paralysis, one suffering from tinnitus and one case with dizziness. There were 2 cases with the miliary metastases and 8 cases with massive metastases. There existed 3 cases with single CPA metastases, whereas 7 cases with multiple metastatic foci. Among the 8 cases of massive metastatic foci, 6 tumors presented the solid features and the other 2 cases exhibited cystic and solid features. In this cohort of cases, 4 cases were involved in the bilateral and 6 cases presented unilateral metastatic foci. The three CPA metastases were removed in this group, 6 case performed with radiotherapy, and 5 cases received chemotherapy. In the current group 5 patients have been dead, 3 patients kept stable and 2 cases experienced improvement. In spite of seldom previous reports regarding the metastases from CNS tumors occurring in the CPA are existent, this rare form of the disease should be considered in future evaluation as a differential diagnosis.

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1. Introduction

Cerebellopontine angle (CPA) tumors are common, in which of acoustic neuroma (AN) occurs in the most cases, with the following is the meningioma. However, a large variety of unusual lesions can also be encountered in the CPA. 0.2–0.7% of all lesions occurring in the CPA are metastases [1]. The CPA metastasis means the tumors in the internal auditory canal and the tumors in the CPA cistern

from cerebrospinal fluid (CSF) dissemination in this article. Among the metastases in CPA the systemic tumors are most common, such as the breast and lung carcinoma [2]. The lesions metastasizing from central nerve system (CNS) are uncommon with some metastases mimicking an AN or meningioma.

2. Methods

A total of 10 cases (male: female, 5:5) were generated containing the clinical and neuroimaging data. Whole cerebrospinal magnetic resonance imaging (MRI) scans were performed in all cases. The primary tumors diagnosed by postoperative pathological results were 9 cases and 1 case was diagnosed with germ cell tumor according to the clinical symptoms, MRI and diagnostic treatments.

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3. Results

3.1. Patient and tumor characteristics

The average age was 23.8 years (range, 3.0–55.0 years). The histopathologic diagnosis of the primary tumors was documented in Table 1. The average length of time from the primary diagnosis to the CPA metastases was 42.4 months (range, 0–144.0 months). Among the 10 cases, the primary tumors and metastases were found simultaneously in 3 cases, the metastases after primary tumors removal were found in 5 cases and 2 cases with metastases were diagnosed after stereotaxic radiosurgery (SRS).

3.2. Symptoms and signs

Only four patients presented with the symptoms and signs association with CPA metastases, one case with hearing loss, this patient (Case 3) suffering from double progressive hearing loss, one case with facial paralysis with the facial nerve function in House-Brackmann Grade III, one case with tinnitus, and one case with dizziness.

3.3. Imaging characteristics

According to growth patterns of the neuroaxis metastases (NM) on MRI, we classified CPA metastases into 2 types, the miliary type and massive type. Miliary type is defined as the tumor cells growing on the surface of the leptomeninges around the cranial nerve VII and VIII, which disseminate in pattern of miliary or linear. There were 2 cases within this subtype (Fig 1, and Fig 5A). Massive type is defined as the diameter of tumor being more than 1 cm with the round and ellipse shape in the CPA cisterns. 8 cases were generated in this group. There were 3 cases with single CPA metastases, and 7 cases with multiple metastatic foci in other sites of CNS. Of the metastatic foci in 8 massive type cases, 6 presented with solid and 2 with cystic and solid features. For the CPA metastases, 4 cases were involved in the bilateral and 6 cases with unilateral metastatic foci.

3.4. Diagnosis

Only one case (case 1) was misdiagnosed as type 2 neurofibromatosis (NF2) in admission from her symptoms and MRI features (Fig 1). The 3-year-old girl suffered from right facial paralysis for about two months, and the MRI demonstrated the bilateral CPA masses and spinal masses. Repeated intracranial MRI revealed that the right tumor had the enlarged processing one and a half months later. Above statements support us with the strong confidence that the diagnosis tends to be the malignancy. The most optional diagnosis was obtained in the other 9 cases accounting for their definite histories of CNS tumors or the initial diagnosis. If all the diagnosis had merely depended on MRI results, 5 cases would be misdiagnosed to NF2, 4 cases to AN, and one case to meningioma.

3.5. Treatment and prognosis

We removed the CPA metastases with large volume and the malignant tissues were insensitive for chemo- and radio-therapy. The miliary type metastases were not suitable for surgery. The CPA metastatic tumors were removed in 3 cases of the current study. Case 4 (Fig 3) was a patient who suffered from germinoma occurring initially at the site of stalk hypophysial and presented with symptoms of polydipsia and polyuria. Consequently diagnosis of germ cell tumor was taken into consideration and γ -knife was recommended to be conducted to control the tumor in another

center with the MRI results indicating that the tumor disappeared 3 weeks after the treatment. However the tumor recurred in the left CPA 2 years later, and γ -knife was performed again for the CPA metastasis. The patient was admitted into our center because of the relapse in the right CPA 8 months after the last γ -knife treatment. In order to decrease the intracranial pressure and identify the pathology, surgery was performed to remove the right CPA tumor. Case 6 (Fig 2D–F) was a patient with the diagnosis of pituitary carcinoma, who received the resection for the sellar tumor 10 years ago and the tumor recurred in the left CPA. We removed the CPA metastatic tumor via the retrosigmoid approach. Case 8 (Fig 4A) was a patient receiving the right temporal lobe glioma resection one year ago, whose tumor disseminated along the neuroaxis with the CPA focus presenting as the largest one among them.

Six cases performed with radiotherapy, and 5 cases with chemotherapy (Table 2). These metastatic tumors aggressed on not only the CPA but also the entire neuroaxis, so the radiotherapy and chemotherapy should be aimed at the lesions in the whole CNS. Three cases received craniospinal irradiation (CSI) for the whole CNS metastases in this group. SRS may be recommended for the metastases less than 2 cm. In this study, 2 cases received SRS for metastases. Germinoma was sensitive for radiotherapy, just as the CPA metastasis in Case 4 disappeared after the radiation (Fig 3C). Case 7 was a patient suffered from GH type pituitary carcinoma with the bilateral CPA metastases shirked after receiving SRS and somatostatin (Fig 2A–C).

In our center, ifosfamide + carboplatin + teniposide (IFO + CBP + Vm-26) chemotherapy was conducted for the medulloblastoma with NM for nine cycles. Before chemotherapy the CSI should be performed for the patients more than 3 years old. Cisplatin + carboplatin + bleomycin (DDP + VM-26 + BLM) chemotherapeutic regimen was recommended for the germinoma in the case that the primary and metastatic foci were found simultaneously. IFO + CBP + Vm-26 regimen would be used for the patients of germinoma with recurrence NM for 4 cycles. In the Case 5, the CPA lesion metastasizing from the primary germinoma disappeared after chemotherapeutic treatment with 4 cycles of IFO + CBP + Vm-26 regimen (Fig 4C and D).

The prognosis was poor for the tumors with CSF dissemination, and was also associated with the pathological features of the primary tumors. In this group 5 patients have been dead, 3 patients kept stable and 2 cases enjoyed improvement.

4. Discussion

Metastatic tumors in the CPA are uncommon, representing only 0.3–0.7% of all lesions in this area. Michael [3] reviewed 102 cases of metastatic carcinomas in the internal auditory canal and CPA, only 3 (2.9%) cases accounting for the metastases from CNS tumor. Tumor cells disseminated to the CPA should be classified into the NM and the rate of CPA metastatic carcinoma is 7.7% (10/130) of metastases from CNS tumors in our center during the same period. In the current study, the glioma is the most common tumor disseminating to CPA, following with the germinoma and pituitary carcinoma. Of all the CNS neoplasms, medulloblastoma has the greatest priority for local, regional, and distant spreading. The tumor may metastasize locally to adjacent structures such as the brain stem and cerebellar surface [4]. NM in AT/RT can be seen on MR in 24% of patients at the initial staging and occurred in another 35% of cases from 4 months to 2.8 years after surgery and earlier imaging examinations with negative findings [5]. CSF dissemination occurs in about 15–25% of supratentorial glioblastoma, but with a higher incidence of up to 60% of infratentorial glioblastoma [6]. Although, the three tumors exhibit high rate of

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