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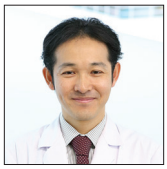
Case Report

Cerebellopontine angle metastasis of a neuroendocrine tumor mimicking vestibular schwannoma: A case report

Shuhei Yamada[1], Noriyuki Kijima[1], Manabu Kinoshita[1], Shinichiro Shinzaki[2], Kazuaki Sato[3], Kansuke Kido[3], Ryuichi Hirayama[1], Naoki Kagawa[1], Tetsuo Takehara[2], Eiichi Morii[3], Haruhiko Kishima[1]

Departments of [1]Neurosurgery, [2]Gastroenterology and Hepatology, [3]Pathology, Osaka University, Graduate School of Medicine, Suita, Osaka, Japan.

E-mail: Shuhei Yamada - s-yamada@nsurg.med.osaka-u.ac.jp; *Noriyuki Kijima - n-kijima@nsurg.med.osaka-u.ac.jp; Manabu Kinoshita - mail@manabukinoshita.com; Shinichiro Shinzaki - shinzaki@gh.med.osaka-u.ac.jp; Kazuaki Sato - kaz.konohana1013@gmail.com; Kansuke Kido - k_kido@molpath.med.osaka-u.ac.jp; Ryuichi Hirayama - rhirayama@nsurg.med.osaka-u.ac.jp; Naoki Kagawa - nkagawa@nsurg.med.osaka-u.ac.jp; Tetsuo Takehara - takehara@gh.med.osaka-u.ac.jp; Eiichi Morii - morii@molpath.med.osaka-u.ac.jp; Haruhiko Kishima - hkishima@nsurg.med.osaka-u.ac.jp



***Corresponding author:**
Noriyuki Kijima,
Department of Neurosurgery,
Osaka University, Graduate
School of Medicine, Suita,
Osaka, Japan.

n-kijima@nsurg.med.osaka-u.ac.jp

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ABSTRACT

Background: Neuroendocrine tumors (NETs) are uncommon neoplasms arising from neuroendocrine cells and are rarely associated with intracranial metastases.

Case Description: We discuss the case of a 74-year-old woman with a right CPA tumor. She had a history of retroperitoneal NET, but was diagnosed with vestibular schwannoma due to a right-sided hearing loss and a right CPA tumor along the VII and VIII nerves. After a 3-year follow-up, she presented with repetitive vomiting, a 1-month history of gait instability, and a 3-month history of general fatigue. Brain imaging revealed tumor growth and edematous changes in the right cerebellum. She underwent retrosigmoid craniotomy and partial resection. Histopathological examination revealed metastatic NET. She underwent stereotactic radiosurgery for residual lesion and, at 11 months of follow-up, the lesion was confirmed to have shrunk on magnetic resonance imaging (MRI).

Conclusion: This is the first case to report the natural course of cerebellopontine metastasis of a NET. The differential diagnosis of CPA tumors is diverse, and, in our case, we suspected a vestibular schwannoma because of the typical symptoms and imaging features. However, the tumor grew relatively faster than expected and showed intratumoral hemorrhage during the 3-year follow-up. Therefore, in patients with a history of a NET, a careful follow-up is advisable even for lesions highly suspected to be another benign tumor on MRI. Careful follow-up imaging and appropriate treatment strategies were useful to manage the brain metastasis. Although NETs metastasizing to the CPA are extremely rare, this possibility should be considered when patients with NETs have intracranial lesions.

Keywords: Brain metastasis, Case report, Cerebellopontine angle tumor, Neuroendocrine tumor, Neuroendocrine tumors, Vestibular schwannoma

INTRODUCTION

Neuroendocrine tumors (NETs) are uncommon neoplasms arising from neuroendocrine cells. The overall incidence is an estimated 1–4 patients/100,000 population/year.[12,15] Intracranial metastases are extremely rare, comprising only 1.3–1.5% of the cases,[5,9] with only one reported case of a NET presenting as a cerebellopontine angle (CPA) tumor.[14] We report a case of a

primary retroperitoneal NET with brain metastasis in the CPA, with features resembling a vestibular schwannoma.

CASE DESCRIPTION

A 74-year-old woman presented to our department for the follow-up of a brain metastasis from a NET. At 65 years of age, she had abdominal pain and gross hematuria, was diagnosed with a primary retroperitoneal NET, and underwent laparotomy at another hospital. She had a left obturator lymph node metastasis at the time of diagnosis and had lung metastasis at 69 years of age. She had been administered octreotide at 70 years, carboplatin and etoposide at 72, and streptozotocin at 73, but all these drugs were discontinued due to disease progression. At 74, she was diagnosed with brain metastases and underwent tumor resection in the left parietal and right frontal lobes at another hospital.

When she presented to our department, a right CPA tumor was observed, and she had a right-sided hearing loss. Since it was located along the VII and VIII nerves and the right internal auditory canal appeared dilated on imaging, it was diagnosed as vestibular schwannoma [Figure 1a]. Since she was asymptomatic except for hearing loss, we observed the lesion with magnetic resonance imaging (MRI) every 2 or 3 months. During follow-up, the tumor gradually increased in size, with some intratumoral hemorrhagic changes [Figures 1b-d]. Furthermore, new metastatic 5–6 mm tumors were detected in the left temporal lobe, and at ages 74 and 76, she was treated with first stereotactic radiotherapy, 25 Gy each in one fraction. She received systemic chemotherapy with streptozotocin and fluorouracil aged 74 and everolimus at 76, but these were discontinued due to disease progression and interstitial pneumonia, respectively. She was then prescribed monthly subcutaneous denosumab for the pain due to the left rib metastasis. Aged 77 years, she presented with repetitive vomiting. She also had a 3-month history of general fatigue and a 1-month history of disorientation, gait instability, and dizziness. On examination, she had mild cognitive decline with a Glasgow Coma Scale score of 14 (E4, V4, and M6), although there were no apparent paralysis and cerebellar ataxia.

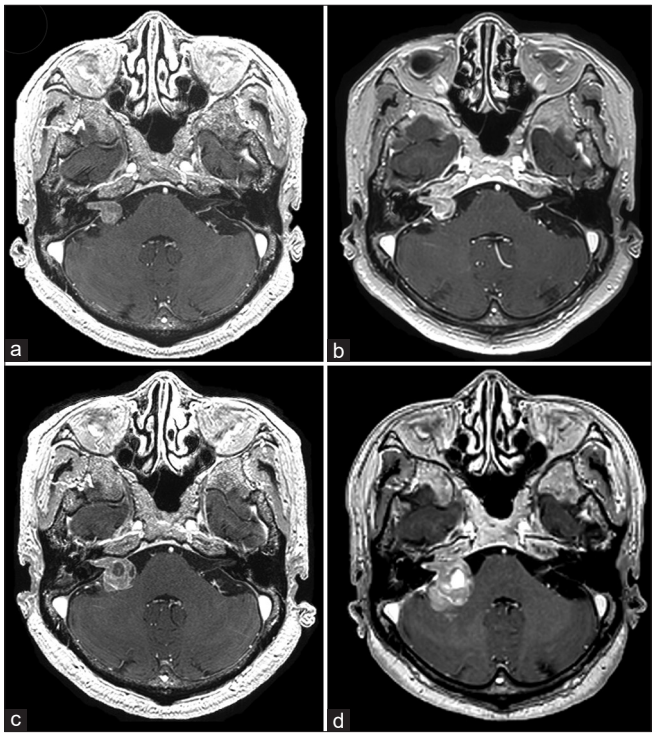

Figure 1: Contrast-enhanced magnetic resonance imaging (CE-MRI) findings of the cerebellopontine angle lesion. (a) Images taken on the first consultation showed a suspicious lesion of about 12 mm in size, resembling a vestibular schwannoma, at the right cerebellopontine angle. (b) CE-MRI images 2 years after the first consultation (13 months before admission) showed no change in the tumor size. (c) CE-MRI images taken 7 months before admission showed an intratumoral cyst and tumor growth to 20 mm. (d) CE-MRI taken 1 month before admission showed intratumoral hemorrhage, edematous changes in the right cerebellum, and tumor growth to 27 mm.

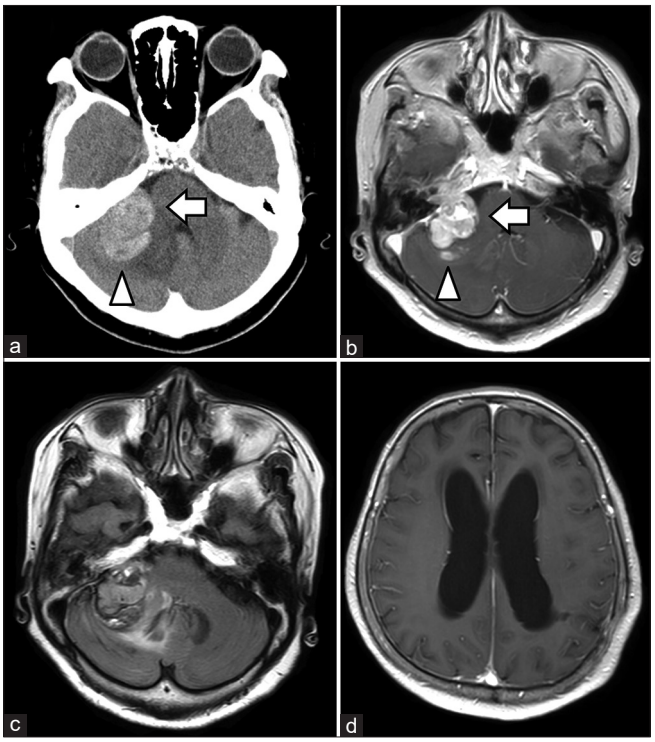

Figure 2: Imaging findings on the day of admission. Computed tomography scan (a), contrast-enhanced magnetic resonance imaging (CE-MRI) (b), and fluid-attenuated inversion recovery (c) images on the day of admission showing the tumor (arrow), hemorrhage (arrowhead), and extensive edematous changes in the right cerebellum. CE-MRI (d) showed the enlargement of lateral ventricles.

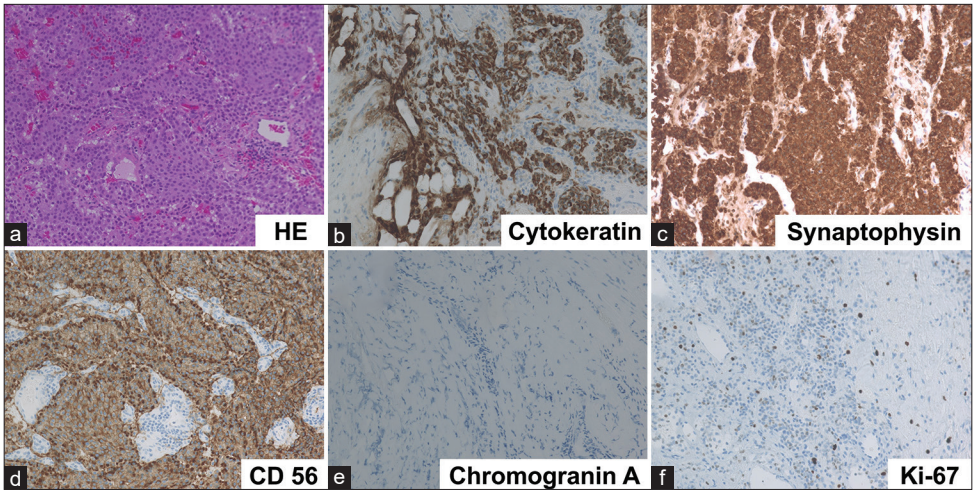

Figure 3: Histological findings indicating metastatic neuroendocrine tumors. Hematoxylin and eosin staining showed monotonous tumor cells with round nuclei and eosinophilic cytoplasm arranged in nested or trabecular pattern (a). Immunohistochemically, tumor cells were positive for cytokeratin (b), synaptophysin (c), and CD56 (d), although they were negative for chromogranin A (e). Ki-67 labeling index was 5.7% (f).

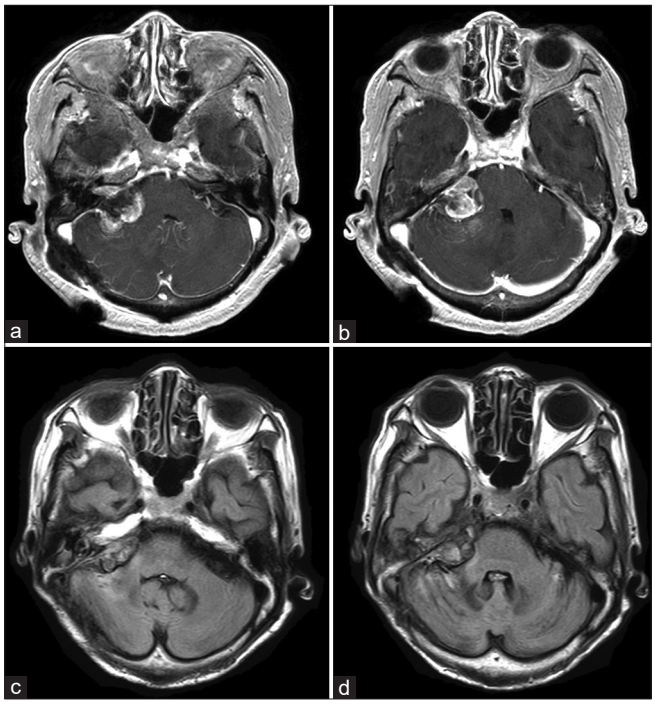

Figure 4: Postoperative imaging findings. Contrast-enhanced magnetic resonance imaging on the next day after the surgery (a and b) showing partial resection of the tumor. T1-weighted MRI 11 months after surgery (c and d) showing a reduction in the size of the residual lesions.

Computed tomography (CT) scan and MRI revealed tumor growth, edematous changes in the right cerebellum, and hydrocephalus [Figure 2]. She underwent retrosigmoid craniotomy for CPA tumor removal and right frontal external ventricular drainage on the 2nd day of admission. The margins between the tumor and cerebellum were unclear and the tumor was highly hemorrhagic; therefore, complete resection was difficult. Histopathological examination revealed metastatic NET comprising monotonous tumor cells arranged in nested or trabecular pattern [Figure 3a], with features similar to those of previous metastatic lesions in the brain. Immunohistochemically, these cells were positive for cytokeratin [Figure 3b], synaptophysin [Figure 3c], and CD56 [Figure 3d], and negative for chromogranin A [Figure 3e]. Ki-67 labeling index was 5.7% [Figure 3f]. The external ventricular drainage was removed on day 5, and a ventriculoperitoneal (VP) shunt (Codman Certas Plus, Integra Life Sciences, Plainsboro, New Jersey, USA) was performed on day 21. Residual lesions [Figures 4a and b] were stereotactically irradiated with 35 Gy in five fractions on days 33–37. Her postoperative course was uneventful, and she was discharged with a Karnofsky Performance Status score of 70.

At 11 months of follow-up, the lesion was confirmed to have shrunk on MRI [Figures 4c and d], and she continued to receive outpatient care.

DISCUSSION AND CONCLUSION

NETs are a rare, heterogeneous group of neoplasms arising from neuroendocrine cells.[12,15] Most of them occur in the gastrointestinal tract (66.9%), lungs (24.5%), occasionally in the hepato-biliary-pancreatic system (1.3%), and ovaries (0.8%).[12] Metastatic lesions occur in 15–40% of NETs, in the regional lymph nodes, liver, lung, and bone, with intracranial metastasis being very rare.[5,9,10] Although the gastrointestinal tract is the most common site,[11,12] most cases of intracranial carcinoid metastasis have primary tumors in the lungs, and primary retroperitoneal NETs are rare and not amply

documented.[9,12] However, multiple brain metastases are relatively common (40–54%).[5,9,10] This patient had been treated for brain metastases twice with radiotherapy and twice with surgery.

The differential diagnosis of CPA tumors is diverse; the most common being vestibular schwannoma (70–90%), followed by meningioma (5–15%), epidermoid cyst (6%), and lipoma (1%).[13] A study of 587 CPA tumors reported no NETs.[7] There has been only one reported case of a CPA NET, where the tumor was exclusively located at the CPA and surgically resected. The patient had shown no evidence of extracranial disease during the 5-year follow-up.[14] In our case, we suspected a vestibular schwannoma because of the typical features on MRI, such as dilatation of the internal auditory canal and slow growth. However, the tumor grew relatively faster than expected and showed intratumoral hemorrhage during the 3-year follow-up. This is the first case to report the natural course of cerebellopontine metastasis of a NET. Furthermore, there are reports of brain metastases of NETs that needed to be differentiated from meningiomas on imaging.[4-6] There is a report of a NET metastasizing to the meningioma itself.[1] This case also had the possibility of NET metastasis to the vestibular schwannoma, but histopathological examination did not reveal any evidence of it. In any case, in patients with a history of a NET, a careful follow-up is advisable even for lesions highly suspected to be vestibular schwannomas or meningiomas on MRI.

There is no standard treatment for intracranial metastases of NETs due to their rarity. Treatments include surgery, stereotactic radiosurgery (SRS), whole-brain radiation therapy (WBRT), and systemic chemotherapy, either alone or in combination.[5,9,10] In this case, surgery and radiotherapy had already been performed several times and the CPA lesion was closely monitored and treated as soon as it became symptomatic.

Brain metastases from NETs are highly vascular and the complication rates (13% mortality and 7% morbidity) of resection are reported to be higher than those of other tumors.[10] Consequently, we decided to limit the extent of tumor removal, ensuring that the mass effect and resulting symptoms were relieved, as long as the surgery could be completed safely. With the addition of a VP shunt and SRS, the patient could be discharged without complications. Thus, we opine that multimodal treatment strategies are useful for treating intracranial metastasis of NETs.

Although WBRT after resection of carcinoid brain metastases has been reported to prolong the survival time,[5] this patient was not treated with WBRT due to the risk of cognitive dysfunction. Similar to this case, there is a report where additional SRS after resection of carcinoid brain metastasis had a favorable course.[3] Salvage SRS is reported to be not inferior to WBRT for metastatic brain tumors.[2,8] Therefore, SRS may also be as effective as WBRT for brain metastases from NETs.

The 5-year survival rate for NETs and those with distant metastases excluding the brain are reported to be 60–67%[12,15] and 38–40%,[12,17] respectively. Notably, the prognosis of patients with intracranial metastases is particularly poor, with the 1-year survival rate of 33–42%[16] and the 5-year survival rate of 10%.[10] Although the overall median survival after the diagnosis of brain metastasis is considered to be 9–19 months,[5,9,10] our patient survived for 4 years after the initial surgery for the brain metastasis. This is comparable to the longest survival of a previously reported case with multiple brain metastases of NETs.[5] It can be suggested that prolonged survival could be achieved by multimodal treatment strategies as described above, including surgery, for brain metastases of NETs.

We encountered a case of a primary retroperitoneal NET that metastasized to the CPA, initially resembling a vestibular schwannoma on imaging. Careful follow-up imaging and appropriate treatment strategies were useful to manage the metastasis. Although NETs metastasizing to the CPA are extremely rare, this possibility should be considered when patients with NETs have intracranial lesions.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent.

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Nil.

Conflicts of interest

There are no conflicts of interest.

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