



Metastatic Brain Tumor in the Cerebellopontine Angle from Gastric Cancer: A Case Report

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Abstract

Cerebellopontine angle (CPA) tumors are a common type of benign tumors, which are similar to vestibular schwannomas; however, the incidence of CPA metastasis is rare. Moreover, brain metastasis from gastric tumors is a rare occurrence, with an incidence of less than 1% in clinical cases. In this study, we report the case of a 71-year-old man who was admitted to our hospital with symptoms of nausea and gait instability for the past 1 week. He had no remarkable medical history. Magnetic resonance imaging revealed a tumor in the left CPA. Intraoperative diagnosis indicated the presence of metastatic papillary carcinoma. Postoperatively, gastric endoscopy revealed a protruding mass on the cardia of the stomach, which was histopathologically similar to that of the resected brain tumor. The patient underwent adjuvant cyberknife radiotherapy and chemotherapy. A prompt biopsy of the brain tumor is essential if any findings suggest malignancy.

Keywords

- ▶ cerebellopontine angle
- ▶ metastasis
- ▶ gastric cancer
- ▶ carcinomatous meningitis

Key Messages

Cerebellopontine angle (CPA) tumors are a common type of benign tumors; however, prompt biopsy is essential if any findings suggest malignancy.

less than 1% of clinical cases. Thus, it might be mistaken for a benign tumor and proper treatment may be delayed due to rarity. In this study, we report a very rare case of a patient diagnosed with CPA metastasis from a gastric tumor and discuss some of the studies in the literature.

Introduction

Cerebellopontine angle (CPA) tumors are a common type of benign tumors, which are similar to vestibular schwannomas and meningiomas; however, metastatic lesions in CPA are extremely rare (0.3%).¹ Similarly, brain metastasis from gastric tumors is a rare occurrence, with an incidence of

Case History

A 71-year-old man visited our hospital with complaints of hearing loss in the left ear, nausea, and gait instability for the past 1 week. He had no history of malignant tumor and no complaints of gastrointestinal symptoms, such as abdominal

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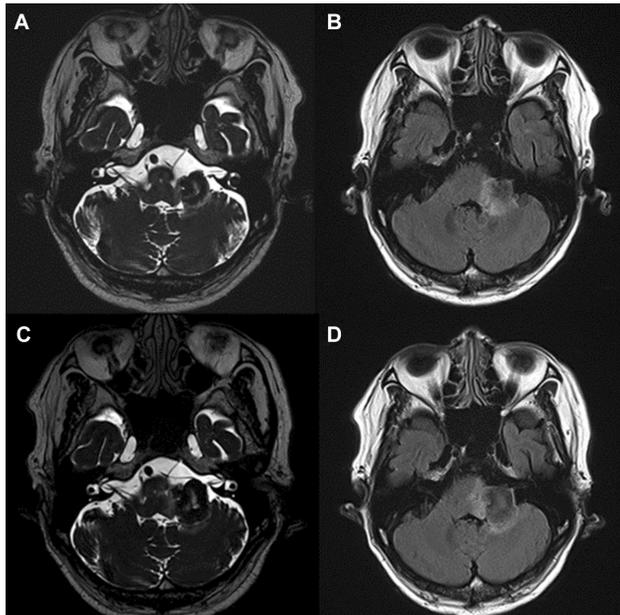


Fig. 1 Radiographic images of the brain. (A) Initial heavy T2-weighted magnetic resonance (MR) image showing a mass in the left cerebellopontine angle (CPA). (B) Initial fluid-attenuated inversion recovery image showing an edematous region around the mass. (C, D) Second MRI within a 2-week interval showing a lesion with edematous changes in the surrounding.

pain, hematemesis, melena, and hemochezia. The patient presented with left sensorineural hearing loss, partial left facial palsy, and bruns nystagmus with diplopia on the left side. The left mean pure tone average (PTA) score was 80 dB (dB), and the mean maximum speech discrimination score was no response. Magnetic resonance imaging (MRI) revealed a mass (size: 2 cm) in the left CPA with surrounding edematous changes (►Fig. 1A, B). All tumor markers were negative and thoracic and abdominal computed tomography scans demonstrated no discernible masses or regional lymphadenopathy, which would suggest malignancy. We confirmed a rapid lesion growth via a second MRI within a 2-week interval (►Fig. 1C, D), and tumor samples were obtained using the retrosigmoid approach. A frozen biopsy revealed a diagnosis of metastatic carcinoma. The tumor was strongly adherent to the acoustic-facial nerve and cerebellum (►Fig. 2A); hence, only biopsy was performed and early adjuvant cyberknife radiotherapy was scheduled.

Postoperative histological examinations revealed a tubular metastatic adenocarcinoma (►Fig. 2B). Gastric endoscopy showed a protruding mass on the cardia of the stomach, which was histopathologically similar to the resected brain tumor (►Fig. 2C, D). Based on these findings, the patient was diagnosed with brain metastasis in the CPA from gastric cancer.

T1-weighted MRI with gadolinium contrast showed no other lesions suggestive of metastasis apart from the CPA lesions (►Fig. 3A–C). Thus, adjuvant cyberknife radiotherapy (dose, 27 Gy) was performed over a 5-day period. The patient was scheduled to undergo chemotherapy via intravenous cisplatin (90 mg/m² of the body surface area [BSA]) on day 8 and oral TS-1 (60 mg/m²) of BSA on days 1–21;

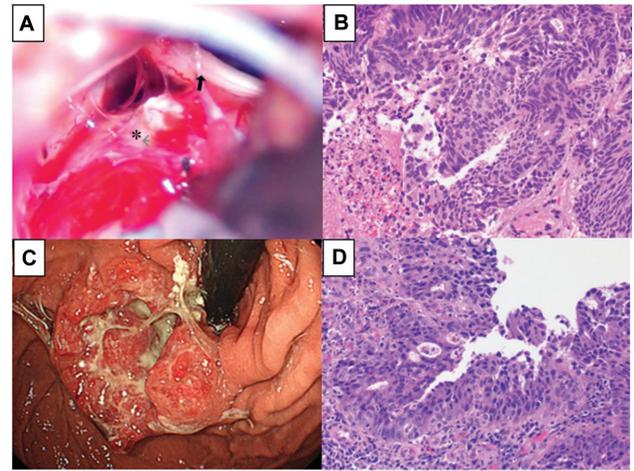


Fig. 2 (A) A left retrosigmoid craniotomy was performed and the tumor (*) was found to be strongly adherent to the acoustic-facial nerve (arrow) and cerebellum. (B) Hematoxylin-eosin (HE) staining of the brain tumor revealed a tubular metastatic adenocarcinoma (100× HE). (C) Gastric endoscopy revealed a protruding mass on the cardia antrum of the stomach. (D) HE staining of the gastric lesion revealed that it was histopathologically similar to the brain tumor (100× HE).

however, the treatment had to be stopped due to vomiting and anorexia. MRI after cyberknife radiotherapy revealed the presence of small lesions in the frontal and parietal lobes (►Fig. 3D–F). A lumbar puncture was performed twice to

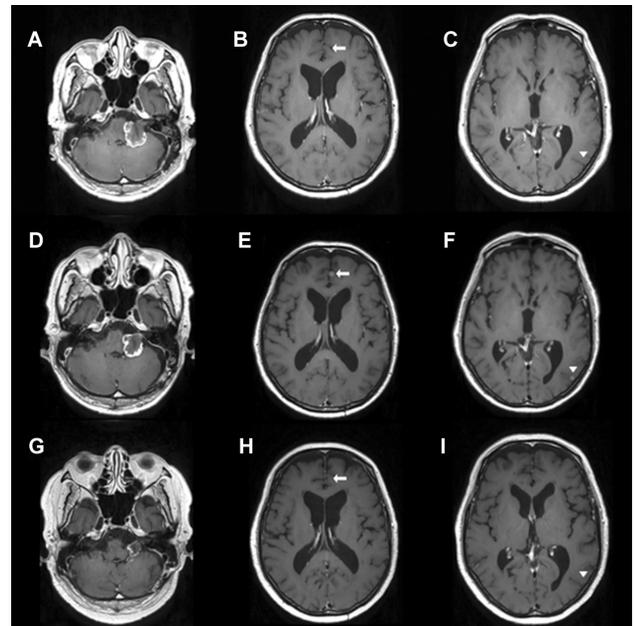


Fig. 3 Changes in MRI images before and after therapy. (A) Initial T1-weighted MR image with gadolinium contrast showing an enhancing mass in the left CPA and no other enhancing lesions (B, C) before adjuvant cyberknife radiotherapy. (D) T1-weighted MR image with gadolinium contrast 3 weeks after cyberknife radiotherapy showed that the mass in left CP angle was reduced. (E, F) However, the metastatic lesions in the frontal (arrow) and parietal lobes (arrowhead) had grown. A third T1-weighted MR image with gadolinium contrast after four chemotherapy cycles showed that the mass in left CPA had reduced (G) and metastatic lesions in the frontal and parietal lobes disappeared (H, I).

Table 1 Previous reports on patients with brain metastases in the cerebellopontine angle from gastric cancer

Case	Year	Age	Unilateral or bilateral	Pathology	Treatment after diagnosis of brain metastases	CM	Survival period
Joo et al ⁴	2013	57/M	Unilateral	por	TG and chemotherapy	No	NA
Lim et al ⁵	2013	59/M	Unilateral	por	STG and chemotherapy	No	NA
Kimura et al ⁶	2019	66/M	Bilateral	por	NA	Yes	46 Days
Bono et al ⁷	1994	NA	Bilateral	NA	NA	NA	NA
Schwesinger, Pusinelli ⁸	1974	NA	NA	NA	NA	NA	NA
Hattori et al ⁹	1986	54/M	Unilateral	ADC	chemotherapy	Yes	3 Months

Abbreviations: ADC, adenocarcinoma; CM, carcinomatous meningitis; M, male; NA, not available; por, poorly differentiated adenocarcinoma; STG, subtotal gastrectomy; TG, total gastrectomy.

exclude leptomeningeal metastasis, and no atypical cells were observed in the cerebrospinal fluid. The patient was then treated by chemotherapy comprising intravenous oxaliplatin (100 mg/m² BSA) on day 1 and oral TS-1 (60 mg/m² BSA) on days 1–14 every 3 weeks. After four cycles of chemotherapy, the left PTA score increased to 48 dB, his gait instability was resolved, and the patient was subsequently discharged.

He was followed up as an outpatient and continued to receive chemotherapy. MRI performed after four cycles of chemotherapy revealed a further reduction in the tumor mass in the CPA, and the small mass in the frontal and parietal lobes had disappeared (►Fig. 3G-I). He continued to undergo chemotherapy in the outpatient setting and demonstrated a progression-free survival duration of 35 weeks.

Discussion

Brain metastasis from gastric tumors is rare, and CPA metastasis from a gastric tumor is even rarer.^{2,3} In this case, MRI revealed intra-axial metastasis to the floccus and not to the choroid plexus of the foramina of Luschka. In this study, a review of the literature from PubMed revealed only six cases of CPA metastasis from gastric tumors (►Table 1).^{4–9} Although it is rare, metastatic brain tumors in CPA should not be followed up as benign tumors, and it is important to distinguish them carefully. It is useful to focus on the clinical symptoms and neuroimaging findings. A previous study showed that the presence of facial palsy and noncontiguous cranial neuropathy and the severity of the symptoms are indicative of a malignant tumor.¹⁰ In this case, the patient presented with left facial palsy and severe nausea and gait instability. In addition, the aforementioned study reported that CPA malignant tumors should be suspected in cases of rapid tumor growth, bilateral CPA lesions, leptomeningeal enhancement, or high signal on diffusion-weighted images.¹⁰ In this case, the rapid growth of the tumor suggested malignancy. Therefore, it is important to perform a biopsy of the brain tumor promptly, if any such physical or neuroimaging findings are observed.

Carcinomatous meningitis (CM) is a rare complication of gastric cancer (0.16–0.69%) with a very poor prognosis.¹¹ It is

important to diagnose the condition and initiate treatment as soon as possible. Cerebrospinal fluid (CSF) evaluation is one of the main diagnostic processes used. Previous studies reported that CSF pressure was higher than 25 cmH₂O in approximately 50%, pleocytosis was detected in 33 to 79%, protein levels were elevated in approximately 80%, and glucose level was decreased in 25 to 40% of patients with CM.^{12–14} Furthermore, the sensitivity of the initial CSF cytology is 55% and increases to 80% when repeated.^{15,16} In this case, CSF evaluation was performed twice to confirm the absence of leptomeningeal metastasis because biopsy was performed and small lesions appeared in the frontal and parietal lobes later. Mild pleocytosis and elevated protein levels were observed, but no abnormalities in CSF pressure, glucose levels, and CSF cytology were observed. Hence, these findings did not support a diagnosis of CM. Previous studies reported that the major risk factors associated with CM include incomplete surgical resection of the brain metastasis or abridgment of postoperative radiation therapy.^{17,18} One study indicated that the risk of CM was 2.81 times more with piecemeal resection than with en bloc resection.¹⁷ In this study, en bloc resection was impossible because the tumor was strongly adherent to the acoustic-facial nerve and cerebellum. Therefore, only a biopsy was performed and early adjuvant cyberknife radiotherapy was scheduled. Some studies have reported the effectiveness of stereotactic radiotherapy for brain metastases from gastric cancer.^{19,20} Thus, a biopsy and stereotactic radiotherapy and chemotherapy may be performed as soon as possible when an en bloc resection is difficult.

The effectiveness of chemotherapy for metastatic brain tumors in patients with gastric cancer is poorly documented. Brain metastases are common intracranial tumors, and their incidence is increasing; however, there are no established therapeutic approaches for this condition. Chemotherapy for brain metastases was previously believed to be ineffective due to the blood–brain barrier (BBB). This structural barrier, which is composed of tight junctions between the capillary endothelial cells of the central nervous system (CNS), plays a protective and regulatory role by restricting the diffusion of particles across the capillaries. The degree to which the BBB restricts the delivery of drugs to CNS tumors remains controversial. However, many previous studies have shown, via

contrast-enhanced MRI, that the BBB was destroyed in metastatic brain tumors; thus, chemotherapy is thought to be effective.²¹ There are some reports on the effectiveness of chemotherapy in patients with lung or breast cancer, a common primary tumor in case of brain metastases, but there are few such reports on patients with gastric cancer.^{19,21} In this study, MRI revealed the disappearance of the brain metastases in the frontal and parietal lobes after four cycles of chemotherapy, which consisted of intravenous oxaliplatin and oral TS-1. These findings suggest that chemotherapy may be considered as a treatment option for patients with brain metastases from gastric tumor.

Conclusion

This study presents an extremely rare case of CPA metastasis from a gastric tumor. It is important to distinguish between metastatic and benign brain tumors and intervene appropriately as soon as possible. Additionally, when metastatic brain tumors are subjected to surgical intervention or multiple brain metastases are observed, the possibility of CM should be considered. Furthermore, although the efficacy of chemotherapy for metastatic brain tumors is uncertain, in case of metastatic brain tumors, the possibility that chemotherapy for the primary tumor may be effective should be considered.

Patient Consent

The patient consented to the submission of the case report to the journal.

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Conflicts of Interest

None declared.

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