Case Report

Rapid growth of metastatic brain tumor from gastric undifferentiated pleomorphic sarcoma: A case report

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ABSTRACT

Background: Brain metastasis from undifferentiated pleomorphic sarcoma (UPS) is a rare occurrence, and its clinical course is little known. In this report, we investigate a case of a rapidly growing brain metastasis from gastric UPS.

Case Description: An 82-year-old man with a known gastric tumor, pathologically compatible with UPS, underwent partial gastrectomy at an outside facility. 3 months later, a 4-cm brain tumor was detected, which was completely resected. The patient was diagnosed with metastatic tumor from previously treated gastric UPS. Within 2 months of the initial resection, a large recurrent mass was detected in the same location, which was again removed. Although the patient underwent radiotherapy and chemotherapy for other metastatic tumors, he died 5 months after the second craniotomy.

Conclusions: Brain metastasis from gastric UPS is rare and difficult to treat. Although aggressive treatment, such as surgical intervention, may improve patient survival in some cases, the timing of treatment is challenging because cerebral metastasis rapidly grows and patients frequently suffer from synchronous systemic metastasis. Therefore, early detection and close follow-up of rapidly progressing brain metastasis are important to improve treatment outcomes.

Keywords: Brain metastasis, metastatic tumor, undifferentiated pleomorphic sarcoma

INTRODUCTION

Undifferentiated pleomorphic sarcoma (UPS) mostly occurs in the extremities and deep-seated soft tissues but has been reported to be found on the limbs (68%) and in the abdominal cavity/retroperitoneum (16%). It commonly occurs in men older than 40 years, with a prevalence of 1–2 cases/10,000 people. UPS has a poor prognosis, with a reported 2-year survival rate of 60%. Gastric UPS are rare occurrences, and reports on clinical presentation are scarce. Kabashima et al. analyzed the data on 16 patients with gastric UPS. The average age in these patients was 61 years, and the main chief complaint was pain. The average diameter of tumor was reported at 6.7 cm, and the 2-year survival rate was 25%. In particular, brain
metastasis from gastric UPS has not been reported in the available literature.\cite{1,2,3,4,5,6}
The central nervous system (CNS) appears not to be a common site for metastatic gastric UPS, probably due to its highly aggressive nature, with UPS often metastasizing primarily to the lung and liver.\cite{8}

Besides, the short overall survival (OS) for this primary disease\cite{8} means that we rarely ever see patients at the later stages of the disease. In this case report, we review a case of rapidly growing brain metastasis from gastric UPS and discuss the management of such metastatic brain tumors.

**CASE REPORT**

This case report is a sequel to that by Kabashima et al.\cite{8} An 82-year-old man underwent laparoscopy-assisted partial gastrectomy for gastric tumor at an outside hospital. The gastric tumor was pathologically diagnosed as UPS, which is a rare high-grade sarcoma. The patient's clinical course after his partial gastrectomy and the case-specific histopathological findings are reported in detail by Kabashima et al.\cite{8} 3 months after the patient's first surgery, he was referred to our hospital due to new-onset dizziness and headaches. Magnetic resonance imaging (MRI) revealed a large cerebellar tumor with marked peritumoral edema. The tumor had not been present on staging scans (whole-body computed tomography [CT]) conducted immediately after the gastrectomy. On admission, brain CT revealed a 43 mm × 38 mm × 32 mm tumor in the left hemisphere of the cerebellum. MRI revealed that the tumor was iso-to-hyperintense on T1-weighted image (T1WI) and hyperintense on T2WI and demonstrated strong contrast enhancement after gadolinium injection (Figure 1). Fluorodeoxyglucose positron emission-CT (18FDG-PET-CT) revealed FDG uptake of SUV max 7.17. No other region with 18FDG uptake was detected.

The patient underwent standard suboccipital craniotomy without navigation or monitoring, performed in the prone position, and the cerebellar tumor was completely resected. The consistency of the white–yellow tumor tissue was dense, and the tissue plane between tumor and normal brain was clearly identified and microscopic gross total resection was achieved, and his postoperative course was uneventful. Postoperative MRI (within 24 h) and contrast MRI (within 72 h) revealed complete resection of the tumor (Figure 2). Symptoms improved after surgery, and he had no deficit and was discharged to go home after 20 days from his operation.

Histopathological analysis showed a proliferation of spindle-to-polygonal-shaped tumor cells with enlarged irregular nuclei and eosinophilic cytoplasm arranged in sheet-like patterns, accompanied by chronic inflammatory infiltration and hemangiopericytomas Staghorn-type branching vessels (Figure 3a and b). Employing Ki-67 stains, mitotic figures were frequently observed. Immunohistochemical panel demonstrated that tumor cells were positive for p53 (Figure 3c) and p16, focally positive for cytokeratin AE1/AE3 CAM5.3, alpha-smooth muscle actin, desmin, and muscle-specific actin (HHF35), but negative for multiple other markers such as cytokeratin CK5/6, CK903, CK14, p40, EMA, GFAP, Oligo-2, IDH-1, ERG, STAT6, and GRIA2. The automated count of MIB-1-labeling index was high and estimated at 37%. We compared brain specimen from the specimen of the stomach after microscopic analysis, and both specimens showed the same histological characteristic. Pathological findings were compatible with that of metastatic tumors from gastric UPS.

The patient underwent repeat brain imaging after 1 and ½ months at follow-up, and no apparent brain tumor residual or recurrence was observed. Only 2 weeks after that last visit, the patient started complaining of headache and nausea. A repeat MRI was ordered, which revealed a 4-cm recurrent cerebellar tumor in the same region, indicating that the 4-cm mass must have grown almost entirely within 2 weeks’ window. Since 2 weeks prior, he had

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**Figure 1:** T1-weighted image (WI) (a) shows the 4-cm tumor in the left cerebellum with hypointense signal. T2WI (b) shows the tumor with hyperintense signal. Axial (c) and coronal (d) images showed the tumor after application of contrast enhancement.

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**Figure 2:** Postsurgical contrast T1-weighted magnetic resonance-images show complete resection of the tumor. (non-contrast T1-weighted image [WI] (a), T2WI (b), contrast T1WI (c), and diffusion- WI (d)).
This page contains a detailed description of a case study involving a patient with metastatic brain tumor from gastric UPS. The text describes the patient's medical history, treatment, and outcomes. The discussion includes the diagnosis of brain metastasis, the role of chemotherapy and radiotherapy, and the prognosis of such cases. The text also highlights the importance of accurate diagnosis and the potential for improved outcomes through aggressive treatment strategies.
Based on our experience with this infrequent UPS brain metastasis, we want to alert neurosurgical oncologists to consider the possibility of brain metastasis from these rare gastric UPSs in their differential. We recommend that the brain should be frequently screened by MRI after resection of such a gastric tumor because UPS brain metastasis has shown rapid growth and it may be difficult to detect them clinically on early routine checkups if there are no symptoms. Further studies are needed to identify the best treatment algorithm which may include surgery, SRS, and adjuvant chemotherapy.

CONCLUSIONS

Brain metastasis from gastric UPS is rare. Although the tumor growth is rapid and aggressive treatment is important, accurate pathological diagnosis is difficult due to the tumor's rarity and its rapid progression. To detect metastatic CNS tumors from UPS early, routine MRI screening should be considered.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. We got patient's consent for his images and other clinical information to be reported in the journal. On his passing, we obtained informed consent from his wife, as the next of kin. The consent was obtained with the understanding that names and initials will not be published, and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

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How to cite this article: Miki K, Yoshimoto K, Yamada Y, Kabashima A, Kuga D, Oda Y, et al. Rapid growth of metastatic brain tumor from gastric undifferentiated pleomorphic sarcoma: A case report. Surg Neurol Int 2019;10:74.