—Case Reports—

A Case of Meningeal Carcinomatosis with Gastric Cancer Which Manifested Meningeal Signs as the Initial Symptom; the Palliative Benefit of Radiotherapy

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Abstract

A 53-year-old male presenting with anorexia, intermittent diplopia, general fatigue, headache and vertigo was admitted to our hospital. He was diagnosed as having gastric cancer by endoscopy of his upper gastrointestinal tract. Brain computed tomography (CT) showed no abnormalities, but magnetic resonance imaging (MRI) showed slight enhancement in the cerebellar sulcus. Cytological examination of cerebrospinal fluid revealed malignant cells. He became blind one week after hospitalization. We diagnosed his condition as meningeal carcinomatosis (MC) and started radiotherapy. His vision improved after four weeks of treatment, and then he became totally blind again. Since his general condition remained poor, we did not perform chemotherapy. He died on the 127th day of hospitalization. MC is a rare pathosis of gastric cancer in comparison with leukemia and malignant lymphoma. This disease does not often show characteristic pictorial images, and early diagnosis is difficult. Moreover, it usually manifests itself in its late stages after several months or more of treatment, and it is rare for MC to be present at the time of initial diagnosis. We present a case of gastric cancer with meningeal signs present when the primary tumors were diagnosed. Radiotherapy alleviated some of the symptoms, and the patient survived for as long as patients undergoing enforced chemotherapy.
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Key words: meningeal carcinomatosis, gastric cancer, MRI

Introduction

Meningeal carcinomatosis (MC) is characterized by the diffuse infiltration of metastatic carcinoma to the meninges, and it is most commonly observed in patients with leukemia, breast cancer, and lung cancer[1]. The diagnosis is often difficult to establish, even when strongly suspected clinically. Definitive diagnosis in most patients is based on the presence of malignant cells in the cerebrospinal fluid. Prognosis is poor, and median survival of MC

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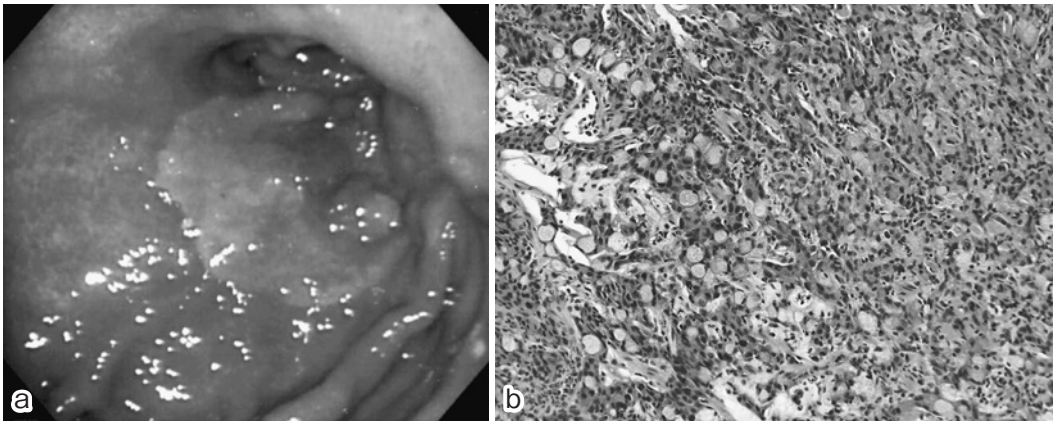

Fig. 1 **a**: Gastroscopy: Endoscopic findings show a large deep ulcer extending from the pyloric antrum to the angulus of the stomach, corresponding to Borrmann type 2. **b**: Pathological findings: Biopsy of the gastric tumor shows a poorly differentiated adenocarcinoma.

Table 1 Blood Analysis, Blood Chemistry and Tumor Marker

Blood analysis		GPT	18 U/L
WBC	6,550 μL	ALP	253 U/L
RBC	593×10^4 /μL	LDH	169 U/L
Hb	14.5 g/dL	BUN	13.3 mg/dL
Ht	45.3 %	Cre	0.9 mg/dL
PLT	33.7×10^4 /μL	T-B	0.6 mg/dL
Blood chemistry		Tumor marker	
TP	7.6 g/dL	CEA	1.0 ng/mL
Alb	4.3 g/dL	CA19-9	7.5 U/mL
GOT	19 U/L		

There were no abnormalities in laboratory findings on admission. The tumor markers were within normal limits.

patients with adenocarcinoma of the gastrointestinal tract is 7 weeks[2]. MC does not commonly occur together with gastric cancer, and it is a rare initial manifestation in gastric cancer. In this report, we present a case of MC in a patient with gastric cancer showing meningeal symptoms that were already evident at the initial diagnosis of the primary site.

Case Report

A 53-year-old male presenting with anorexia, intermittent diplopia, general fatigue, intermittent headaches and vertigo was admitted to our hospital. About 6 months before his admission, he had developed a poor appetite. He had visited another hospital because of the gradual onset of fatigue, and gastrointestinal endoscopy showed advanced gastric cancer. He was immediately referred to our hospital. On admission, physical examination revealed no cardiopulmonary abnormalities or abdominal tumors. There was no neck stiffness and no evident cranial nerve palsy, although remarkable general malaise, anorexia, diplopia, general fatigue and vertigo were observed. A blood biochemical test showed no abnormalities, and the tumor markers were within normal limits (**Table 1**). The upper gastrointestinal series showed advanced gastric cancer (type 2), which had expanded the angulus to the antrum, although the pylorus was not constricted (**Fig. 1a**). Histological diagnosis of a biopsy specimen obtained by endoscopy revealed a poorly differentiated adenocarcinoma (**Fig. 1b**). Computed tomography (CT) showed no metastatic lesions in the liver or lungs (**Fig. 2a and 2b**).

The patients dizziness grew daily worse, he developed vertigo and diabetes insipidus, and became totally blind even though he did not lose consciousness. Brain CT showed no abnormalities (**Fig. 3a**). However, gadolinium-enhanced magnetic resonance imaging (MRI) showed that the cerebellar sulcus was slightly enhanced. MRI showed no thickening of the dura-arachnoid, pia-subarachnoid space enhancement, rimlike enhancement of the ependyma of the lateral ventricle, or nodular enhancement in the subarachnoid space (**Fig. 3b**).

A cerebrospinal fluid examination showed no abnormalities in the first tap, but a large quantity of PAS-positive cells was observed in the second tap,

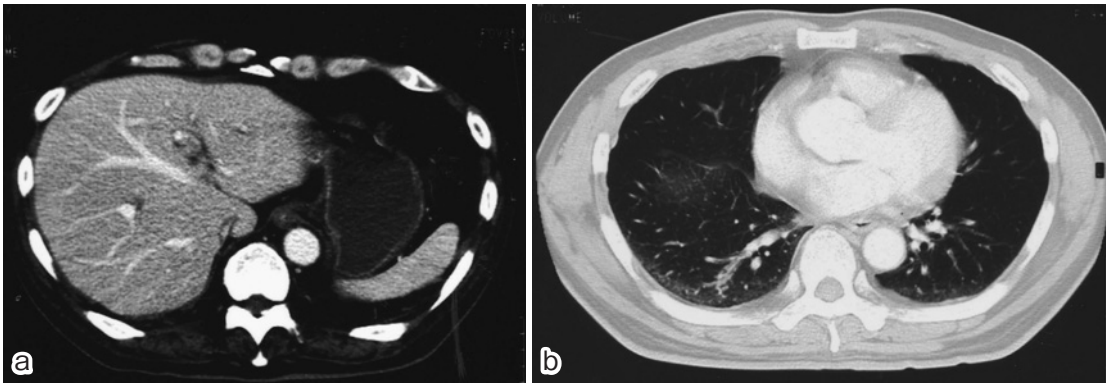

Fig. 2 **a**: Abdominal CT: Abdominal CT does not show ascetic fluid or hepatic metastasis. **b**: Chest CT: Chest CT does not show lung metastasis.

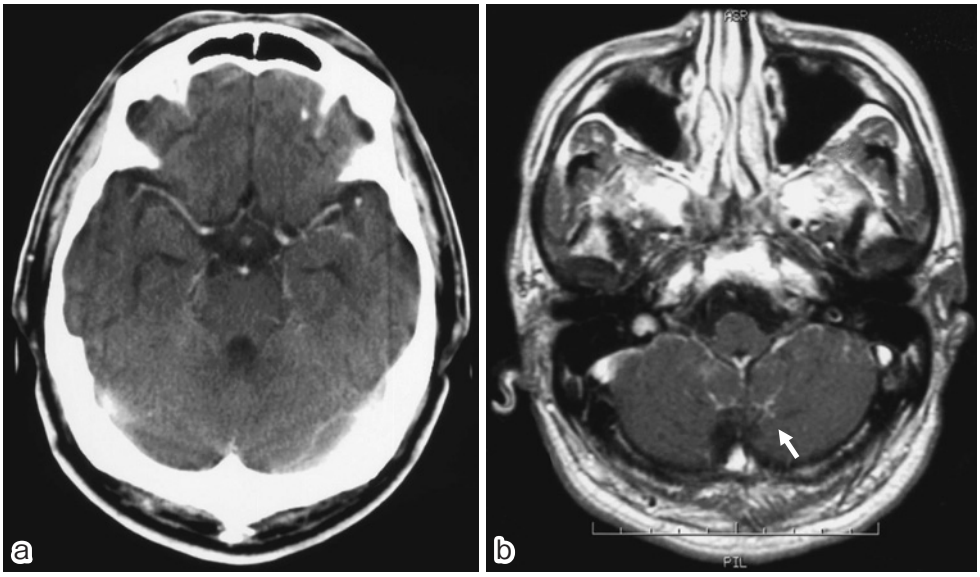

Fig. 3 **a**: Brain CT: Brain CT scan shows no abnormalities. **b**: Brain MRI: MRI shows that the cerebellar sulcus was lightly enhanced. MRI does not show thickening of the dura-arachnoid, pia-subarachnoid space enhancement, rimlike enhancement of the ependyma of the lateral ventricle, or nodular enhancement in the subarachnoid space.

and a diagnosis of meningeal carcinomatosis was made.

We treated the patient with whole-brain radiation (1.8 Gy/day, total 45 Gy) and administered betamethasone (16 mg), decreasing the dosage gradually every 3 days to 4 mg. His vision improved after one week of treatment, but he subsequently became totally blind again. Because his general condition was poor, we did not perform chemotherapy. He became very drowsy and died on the 127th day of hospitalization.

Discussion

MC is defined as the diffuse involvement of leptomeninges by infiltrating malignant cells. The most common primary site of MC is breast carcinoma in the solid tumor[3,4], and MC with gastric cancer is rare. Giglio et al. reported that the frequency of occurrence of MC from gastric carcinoma was 0.19%[2] and Lee et al. reported a prevalence of 0.17% of MC in a review of 11,335 patients with gastric carcinoma[5]. Most cases have active disease outside the nervous system, including metastases to the lungs, liver and bone[5]. Our case

Table 2 The symptoms and signs of MC

brain symptoms and signs	headache diabetes insipidus	change in mental status
cranial nerve symptoms and signs	Diplopia facial numbness	hearing loss loss of visual acuity
spinal symptoms and signs	paresthesias pain in the back or neck	weakness of the legs bladder and bowel dysfunction

was rare because it was not accompanied by metastasis to any major organs, including the liver and lungs. Adding to its rarity was the fact that meningeal signs were observed at the same time as the primary tumors were diagnosed. In most patients, the diagnosis of MC is made 6 months to 3 years after the primary tumor is discovered. There have been only two cases reported of adenocarcinoma of the gastrointestinal tract diagnosed with MC at the same time that the primary tumors were diagnosed: one case of esophageal cancer and one of pancreatic cancer[2].

Prompt and early diagnosis of MC is important, since fixed neurologic deficits such as paraplegia do not resolve with therapy[1]. Therefore, it is important to consider the presence of MC from symptoms and signs; the symptoms and signs of MC can be classified into three groups (**Table 2**). The first group consists of brain symptoms and signs, including headaches, changes in mental status, and diabetes insipidus. Headaches are associated with nausea and/or vomiting in many patients, and those who have diabetes insipidus may also have brain metastasis[3]. Our patient complained of headaches, so he underwent brain CT. However, neither the brain CT nor cerebrospinal fluid cytology (from the first tap) showed any abnormalities. When he developed nausea in association with the headaches, we performed MRI, which showed slight enhancement of the cerebellar sulcus. He developed diabetes insipidus on the 89th day of hospitalization, but neither MRI nor CT showed any brain metastasis. The second group consists of cranial nerve symptoms and signs. The most common complaints in this group are diplopia, hearing loss, facial numbness and loss of visual acuity[3]. Our patient complained of only intermittent diplopia on admission, although he later became totally blind; this is not common. The third group is spinal symptoms and signs. The most common complaint is weakness in the legs, paresthesias, pain in the back or neck, and bladder and bowel dysfunction[3]. Our patient showed no spinal symptoms on admission, but he complained of back pain on the 58th day of hospitalization.

Current diagnostic methods, including cerebrospinal fluid cytology, CT and MRI, can be insensitive and nonspecific. A diagnosis of MC can only be proven by the presence of cancer cells in the cerebrospinal fluid. In the case of meningeal metastasis from non-central nervous system neoplasms, cerebrospinal fluid cytologic results are positive in 50% of cases after a single lumbar tap and in 85 to 90% of cases after multiple taps[3]. Meningeal carcinomatosis is often difficult to detect with CT[6]. T1-weighted gadolinium MRI is the preferred imaging modality for MC. Yousem et al. reported an MRI detection rate of 35% for MC in a cohort of 40% of patients with positive cerebrospinal fluid cytologic results[7]. Even so, CT scans showed no significant findings, even after the symptoms of MC had appeared. Gadolinium-enhanced MRI showed that the cerebellar sulcus of the brain was slightly enhanced; however, it did not show a thickening of the meninx. If MC is suspeced, even if CT results are normal, enhanced-MRI is necessary.

Our patient's clinical symptoms clearly indicated MC, so we started him on radiotherapy. The optimum treatment has not yet been established, because the published studies mostly involve small, non-controlled trials; however some reports deal with the question of treatment[8]. The treatment goals in patients with MC are to improve the neurologic status of the patients and to prolong survival. Without therapy, the median survival is 4 to 6 weeks, and death usually results from progressive neurological dysfunction[3]. Although solid tumors are not as radiosensitive as leukemias, as previously reported[1], radiotherapy is considered to relieve the symptoms, and whole brain radiotherapy is thought

to be safe for patients with MC[3]. Although intrathecal injection of methotrexate (MTX) is recommended[4], the impact of intrathecal chemotherapy is limited in most patients with MC[1,4]. In small cell lung cancer, no significant difference has been noted in survival between the treated and non-treated patients[9], and the same applies to adenocarcinoma of the gastrointestinal tract[2]. Still, the median survival of aggressively treated patients with MC is no longer than 3 to 6 months[10]. Lee et al reported a poor prognosis of MC from gastric carcinoma, with a median survival of 4 weeks (range: 3–39 wks)[5]. Bokstein et al reported that 30% of patients receiving chemotherapy (intrathecal fluid chemotherapy or systemic chemotherapy) died within the first month of treatment and that the application of intrathecal chemotherapy offered no advantage when survival was used as an end point[10]. Tsujikawa et al reported that in spite of repeated intrathecal injections of methotrexate (10 mg), a patient who had gastric cancer with meningeal carcinomatosis died 32 days after admission[11]. Braeuninger et al also reported that a patient who had gastric cancer with MC did not respond to intrathecal MTX chemotherapy[12]. Our patient completed the planned course of radiotherapy (45 Gy) without chemotherapy because of his poor condition. Betamethasone was administered at the same time. His symptoms were relieved, and he lived for 127 days, but this survival period was thought to be no different from that of patients undergoing enforced chemotherapy.

MC with Gastric cancer is a lethal pathosis, and even if we provide multidisciplinary treatment, survival time is very short. Therefore, the therapeutic goal is improvement of QOL, and therapeutic risks should be avoided as far as possible. Evidence of intramedullary chemotherapy is still insufficient, and we cannot expect systemic chemotherapy to be effective even if we used new drugs. On the other hand, radiation and steroids are low-risk and result in symptom reduction. Therefore, we consider the first choice in treating MC with gastric cancer treatment to be radiation and steroids. However, performance status and symptoms vary from patient to patient, and it is very important to keep patients informed about the therapeutic options.

Conclusion

We report a case of meningeal carcinomatosis in a patient with gastric cancer who showed clear meningeal symptoms when the initial diagnosis of the primary site was made. Radiotherapy and betamethasone were effective in relieving the symptoms.

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