Skull Base Metastasis from Gastric Cancer
—Case Report—

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Abstract
A 48-year-old male presented with a metastatic skull base tumor located on the right of the clivus and the sphenoid sinus, which originated from adenocarcinoma of the stomach. The initial symptom was abducens nerve paralysis and there were no symptoms of upper gastrointestinal tract throughout the course. This gastric cancer, which rarely metastasizes to the central nervous system or osseous system, caused multiple bone metastases which produced the neurological symptoms.

Key words: gastric cancer, metastasis, bone tumor, skull base tumor

Introduction
Metastatic bone disease can originate from almost any malignancy, but the most common primary foci are breast and prostate cancer. Skull metastasis demonstrates the same characteristic. Gastric cancer is one of the least frequent primary tumors causing intracranial metastases, but meningeal carcinomatosis has been reported. Vertebral metastases may occur, although usually in the terminal stages.

Here, we report a patient presenting with abducens nerve paralysis caused by a tumor located on the right of the upper clivus. Unexpectedly, the tumor was a metastatic carcinoma derived from a gastric cancer.

Case Report
A 48-year-old male was well until April 17, 1990, when he noticed double vision followed by weakness of the left upper extremity. He consulted a local doctor who found right abducens nerve paralysis. Magnetic resonance (MR) images on May 22 were thought to be normal (Fig. 1). He suffered from severe low back pain when washing his face on May 31. An orthopedist discovered a fracture of the L3 vertebral body on plain lumbar x-ray films. He also complained of numbness of the right face. Medical treatment did not ameliorate these symptoms, so he was admitted to our department on June 27.

Physical examination revealed right abducens nerve paralysis, hypesthesia of the right face, and absence of ciliary and corneal reflexes of the right eye. Slight weakness of the left upper extremity with atrophy of the deltoid muscle, and hypesthesia along the left ulnar nerve were also noted. Laboratory in-
vestigations demonstrated marked increases in lactic dehydrogenase, alkaline phosphatase, alpha-fetoprotein, and CA19-9 (carbohydrate antigen) levels, all signs of malignancy.

MR images demonstrated an abnormal intensity mass located in the upper portion of the clivus extending to the right side of the sphenoid sinus. The images were quite different to those taken 1.5 months before. The mass was strongly enhanced by intravenous injection of gadolinium-diethylene-triaminepenta-acetic acid (Gd-DTPA) (Fig. 2). Other small osteolytic lesions were noted within the occipital and the parietal bones. Right external carotid angiograms showed obvious tumor stains. Although chest polytomograms showed no lung metastasis, plain thoracic and lumbar x-ray films demonstrated destruction of the Th8 and L3 vertebral bodies. Systemic bone scintigrams demonstrated multiple metastases to the skeletal system, including skull vertebræ, scapula, and humerus.

Abdominal echograms and computed tomographic scans suggested gastric cancer. A fiber endoscopic study of the stomach confirmed an advanced cancer of Borrmann type III at the greater curvature (Fig. 3). Lumbar puncture yielded a watery-clear fluid without increased pressure, and cytological examination demonstrated no malignant cells.

He developed severe intractable back pain from the beginning of July, possibly caused by the vertebral metastases. On July 18, a biopsy of the intracranial tumor was made and the pituitary gland removed to relieve pain through a transsphenoidal approach. A hemorrhagic tumor was found in the posterior half of the sphenoid sinus extending into the right cavernous sinus. Histological examination of the surgical specimen indicated poorly differentiated adenocarcinoma, quite similar to the gastric endoscopic biopsy (Fig. 4).

Hypophysectomy achieved transient pain relief, but the neurological status remained unchanged. An anticancer chemo sensitivity assay (deoxyribonucleic acid synthesis inhibition assay) indicated 5-fluorouracil, cis-platinum, and epirubicin treatment. Despite the intensive treatment provided, his general condition progressively deteriorated and he died of cachexia on August 4. Autopsy was not performed.

Discussion

Metastases may occur anywhere in the skull, including the skull base.\(^7\) The most frequent site is the parasellar region.\(^9\) Several examples of metastatic
tumors have occurred in the sphenoid bone, dorsum sellae, and clivus.\(^8\) The initial symptoms of abducens nerve paralysis and subsequent facial numbness in this case were undoubtedly due to a metastatic deposit on the upper clivus, although not detected by the first MR study. Retrospective analysis of the images, however, found a low-intensity area replacing the high intensity of marrow fat normally seen in the clivus (Fig. 1). Unfortunately, Gd-DTPA enhancement was not performed. The subsequent paresis of the left upper extremity and intractable back pain were possibly caused by vertebral metastases. The patient therefore suffered from multiple metastases to the osseous system, and the cranial nerve involvement was one manifestation.

The most common sources of bone metastases are breast, prostate, kidney, and thyroid tumors.\(^7\) Kistler and Pribram\(^4\) reported 11 cases with metastatic disease of the sella turcica, originating in the prostate, breast, lung, thyroid, or lymphosarcoma malignancies. Two patients had no history of malignancy of a primary organ. Gastric cancer demonstrates one of the least frequent incidences of metastasis to the osseous system, although vertebrae are occasionally compromised in the terminal stages. Moore\(^5\) found no bone metastases in 1600 patients with gastric cancer at the Mayo Clinic. This extreme rareness was rationalized by a malignant condition of the stomach following a rapid course resulting in death unless immediate treatment was given.

Central nervous system metastases from gastric cancer of the gastrointestinal tract are also unusual, with meningeval carcinomatosis being the most common form.\(^1,6,10\) Harada et al.\(^3\) reported a rare case of skull base metastasis from stomach cancer presenting with Garcin's syndrome. The multiple cranial nerve palsies were caused by meningeval dissemination, although cerebrospinal fluid analysis revealed no abnormality.

The mechanism of the peculiar metastasis in this case is difficult to elucidate. Multiple metastases were found at the terminals of branches of the right external carotid artery, so the usual hematogenous spread of adenocarcinoma cells via the systemic circulation is the most likely. Whatever the mechanism, the present case demonstrated an extremely unusual pathogenesis.

Advanced therapeutic regimens, including radiation therapy, chemotherapy, and immunotherapy, will provide more means to treat metastatic diseases. The recent development of neuroradiological diagnosis may identify more metastatic neurological diseases without a known history of malignancy. The primary source of cancer may occur in organs unlikely to produce intracranial metastases. Metastatic disease should always be considered for the differential diagnosis, and prompt management is mandatory for patients with unusual clinical features such as those described in the present case.

References


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