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# A 6-Year Controlled Gastric Adenocarcinoma Metastasized to the Lung, Cervical Spine and Mandible in a Japanese Male: A Patient Report

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**Gastric adenocarcinoma metastasized to the lung, cervical vertebrae and mandible 6 years after gastrectomy in a 70-year-old man. When the man visited our clinic, he complained of pain in the left mandible with paralysis in the left lower lip and diffuse swelling with a fluctuation inside the left ramus of the mandible. Medium contrast computed tomography (CT) presented bone loss that looked like a wormhole at the left angle of the mandible. Magnetic resonance imaging (MRI) revealed abscess or osteomyelitis at the site. He showed no response despite treatment with antibiotics, and we suspected a neoplastic lesion. With a mandibular ramus specimen obtained by biopsy and examined histopathologically, adenocarcinoma of the salivary gland was strongly suspected. MRI presented a neoplastic lesion in his cervical vertebrae, and by biopsy he was diagnosed with adenocarcinoma. Thereafter, chest CT presented multiple pulmonary metastases. Considering the patient's history of gastrectomy due to gastric adenocarcinoma, the stomach, cervical vertebrae or mandible were examined pathologically and immunohistochemically by biopsy: all specimens showed a moderately differentiated type of tubular adenocarcinoma, and the results for cytokeratin-related tumor markers were the same. We finally diagnosed him as having metastases from gastric adenocarcinoma to the lung, cervical vertebrae and mandible. Because the metastases had spread to multiple organs, the mandibular lesion was not treated, and terminal care in another facility was unavoidably selected. In making a differential diagnosis of multiple metastases, pathological and immunohistochemical examinations of metastatic lesions by biopsy were very useful based on the diagnostic imagings by CT and MRI.**

**Key words:** controlled gastric adenocarcinoma; cytokeratin; mandible; metastatic tumor

Metastatic tumors in the oral region account for about 1% of all oral carcinomas. The incidence is low, and many patients contract metastatic tumors with no former management of primary sites. We encountered a patient with gastric adenocarcinoma treated by 75% gastrectomy 6 years previously wherein the primary site had long been kept under control. We found cancerous metastases in his lungs and on his cervical vertebrae and mandible. Here we report a brief summary of the case.

## Patient Report

A 70-year-old man noticed a pain in the left mandible with paralysis in the left lower lip, and

Abbreviations: CT, computed tomography; MRI, magnetic resonance imaging

visited a nearby dental clinic in December 2004, where his lower left 1st molar was extracted. However, the symptoms did not improve and swelling of the buccal region appeared with an increasing frequency. He visited our clinic at Tottori University Hospital in January 2005. The patient had gastric adenocarcinoma resected 6 years previously. By intraoral examination, we observed discharge of pus from the extraction wound of the lower left 1st molar, and diffuse swelling with fluctuations inside the left ramus of the mandible. Viscous fluid was obtained by puncturing the swelling. A medium contrast computed tomography (CT) scan revealed bone loss resembling a wormhole at the left angle of the mandible (Fig. 1). Magnetic resonance imaging (MRI) showed a high signal with T2 emphasis at the left angle of the mandible, where the internal cortex was partially destroyed. During examination, a T2 high signal appeared multilocularly between the destroyed cortex and inside of the masseter muscle. The signal from the left masseter muscle to the periphery of the lateral pterygoid muscle suggested the spread of inflammation. So, we suspected osteomyelitis or abscess (Fig. 2). Laboratory studies showed normal values except for the amylase level (161 IU/L). We histopathologically examined a biopsy specimen of the mandibular ramus and suspected adenocarcinoma originating from the salivary gland (Fig. 3). At that time, the patient noticed a sharp pain in the cervix, and was referred to the Orthopedic Surgery Clinic of our hospital. There, he underwent MRI, which revealed a neoplastic lesion of the cervical vertebrae (Fig. 4). Through biopsy carried out under CT guidance, we made the diagnosis of adenocarcinoma. Consequently, he was subjected to a complete medical workup: a CT scan showed multiple tubercles and cystic lesions in both pulmonary fields by which we made the diagnosis of lung metastases. Consider-

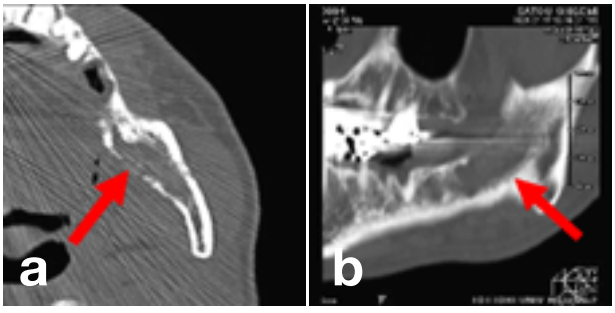


**Fig. 1.** Bone loss looking like a wormhole is visible at the left angle of the mandible (arrow) by computed tomography with contrast medium. **a:** Transaxial view. **b:** Lateral view.

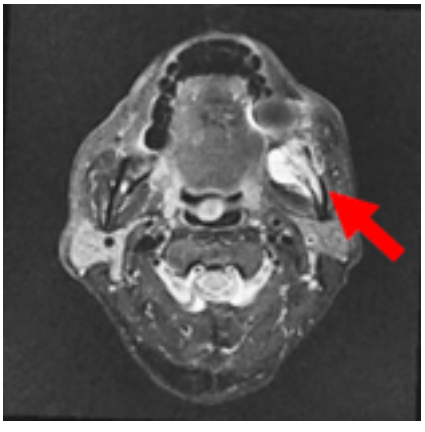

**Fig. 2.** Magnetic resonance imaging shows partial loss of the cortical bone of the left ramus of the mandible, which shows a high signal destroyed by T2 emphasis. The high T2 signal is multilocularly seen between the destroyed cortex and inside of the left masseter muscle (arrow

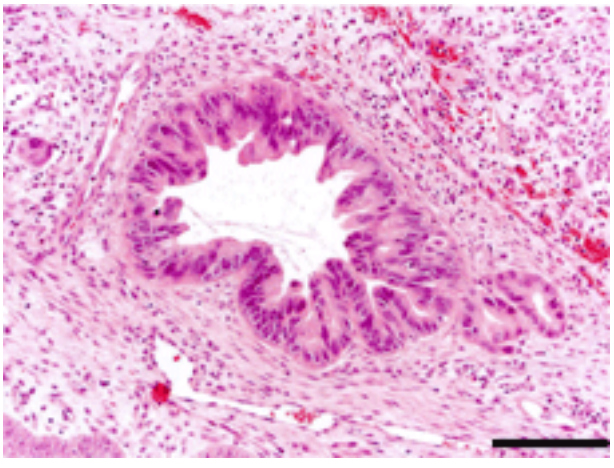

**Fig. 3.** Glandular atypical epithelium is found in several places with inflammation on the biopsy specimen of the mandibular ramus (hematoxylin and eosin stain). Bar =100 μm.

**Fig. 4.** Magnetic resonance imaging shows a pathological fracture in the cervical vertebrae, stricture of the vertebral canal and the oppression of the spinal nerve (arrow).

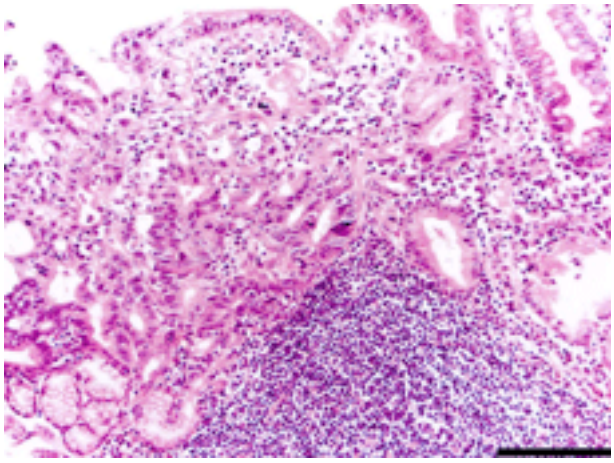

**Fig. 5.** A moderately differentiated type of tubular adenocarcinoma is observed in a biopsy specimen of gastric adenocarcinoma of the patient (hematoxylin and eosin stain). Bar =100 μm.

ing his history of having a 75% gastrectomy 6 years previous due to gastric adenocarcinoma, we histopathologically examined biopsy specimens from the gastric region and cervical vertebrae, and observed the moderately differentiated type of tubular adenocarcinoma in all specimens (Fig. 5). We also examined biopsy specimens of the stomach, mandible and cervical vertebrae immunohistochemically. The results of the staining were the same in all specimens: positive for cytokeratin AE1/3, EMA, CK7 (Fig. 6a), CA19-9 (Fig. 6b) and CEA (Fig. 6c) and negative for cytokeratin 20, CA125 and PSA. Ultimately, we diagnosed his disease as metastatic adenocarcinoma from gastric adenocarcinoma to the lung, cervical vertebrae and mandible. The metastasis spread throughout his whole body to the point where no further active treatment was possible. The patient was transferred to another facility, where he received palliative therapy. The progress of the tumor was rapid, and the patient died of pulmonary insufficiency 2 months later.

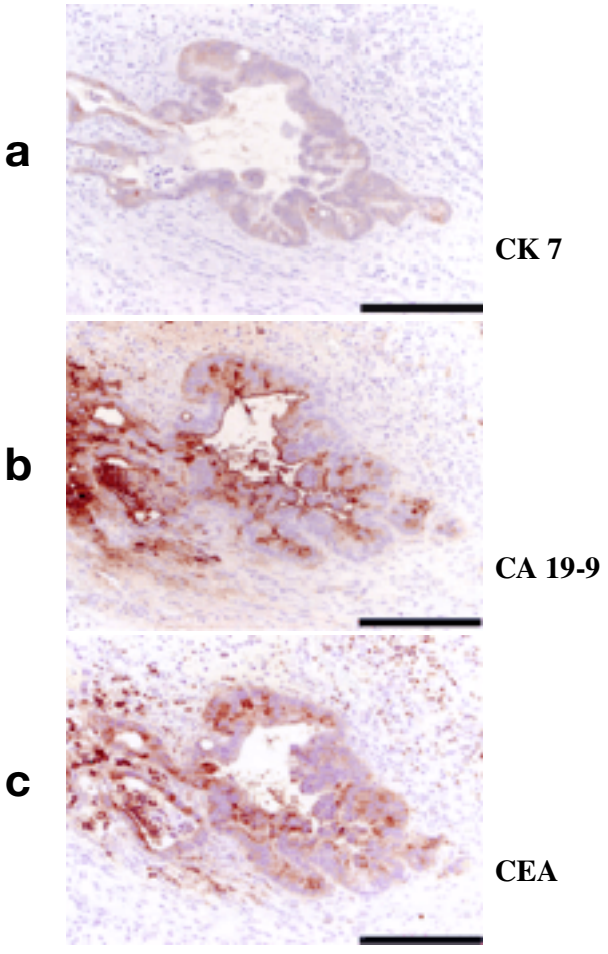


**Fig. 6.** Immunohistochemical detection of metastases to the mandible in the glandular epithelium on the biopsy specimen of mandibular ramus: positive staining for AE1/3, EMA, CK7 (**a**), CA19-9 (**b**) and CEA (**c**); and negative staining for CK 20, CA 125 and PSA. The results match those observed in the primary gastric adenocarcinoma. Bar =100 μm.

## Discussion

Of all oral carcinomas, about 80% are squamous cell carcinomas, followed by salivary gland carcinomas, malignant lymphomas, and metastatic tumors to the oral region with a decreasing incidence of about 10%, 4% and 1% (Meyer and Shklar, 1965; Chin et al., 1998; Vahatalo et al., 2000). The main characteristic of oral squamous cell carcinoma is ulcer formation, except for intraosseous carcinoma of the mandible, and diagnosis is relatively easy. But many metastatic tumors are adenocarcinomas (Handa et al., 1990) with no ulcer formation, and diagnosis of metastatic tumor can be difficult. Sometimes discriminating between carcinomas originating in the oral cavity and metastatic tumors originating elsewhere is difficult even when lesions show histopathologic features of squamous cell carcinoma. For diagnosis of metastatic tumors, Zegarelli et al. (1973) established the following critera: i) the primary tumor elsewhere is proved clinically and pathologically; ii) metastatic and primary tumors are histologically similar; iii) no tumor existed on the metastatic site in the past; and iv) there is no direct invasion from any primary or other metastatic tumor in adjacent organs. Clausen and Poulsen (1963) established the following criteria for metastatic tumor: i) the lesion must be a true metastasis localized to the bone tissue, as distinguished from direct invasion by a primary tumor in relation to the jaw and/or from metastases to the surrounding soft tissue; ii) it must be a microscopically verified carcinoma; and iii) the location of the primary tumor must be known to ensure that researchers are dealing with a secondary lesion. When a tumor is a squamous cell carcinoma or adenocarcinoma, we should examine histopathologically whether the tumor is of oral origin or a metastasis. In our patient, the biopsy specimen inside the part of the left mandibular ramus proved that it was an adenocarcinoma: we needed to make a clear distinction between an adenocarcinoma of the salivary gland and a metastatic tumor from gastric carcinoma.

The most frequent site of metastasis from gastric carcinoma is the liver. Our patient was not involved in hepatic metastasis from gastric carcinoma. But patients with metastasis to the oral region have been frequently without metastasis to the liver (Colombo et al., 2005). Tubular adenocarcinoma very rarely arises in the minor salivary gland. Adenocarcinoma originating from the minor salivary gland develops in the soft tissue of the oral cavity because the minor salivary gland exists in the submucosa. In this patient, adenocarcinoma occurred in the mandible, partially infiltrating the adjacent soft tissue. In consideration of these facts, his adenocarcinoma did not arise from the minor salivary gland but metastasized from gastric carcinoma to the mandible.

Furthermore, in immunohistochemical examination of the biopsy specimens of the stomach, mandible and cervical vertebrae, all specimens showed the same staining results: positive for cytokeratin AE1/3, EMA, CK7, CEA and CA19-9, and negative for cytokeratin 20, CA125 and PSA. These conditions agree with the criteria established by Zegarelli et al. (1973) and Clausen and Poulsen (1963). Therefore, we finally diagnosed his disease as metastatic adenocarcinoma from gastric carcinoma to the lung, cervical vertebrae and mandible. Our case is further proof that immunohistochemical examination is very useful when it is difficult to give a definite diagnosis (Alvarez-Alvarez et al., 2006).

The primary sites of metastasis to the oral region are the lungs (25.2%), kidneys (14.6%), uterus (12.6%) and stomach (11.7%) (Koizumi et al., 2004). Pancreatic carcinoma does not metastasize easily because it is aggressively lethal to the system well before it metastasizes to the oral region (Hirshberg et al., 1993). Gastric carcinoma is relatively well controllable with a high survival rate. This fact could increase the possibility of metastasis to the oral region.

In analyzing the period from initial diagnosis of the primary lesion to metastasis to the oral region, metastases to the jaw appeared on an

average of 39.5 months (Kataoka et al., 2003). In that study, 17 cases of metastases to the oral region were examined by dividing them into well- and poorly-controlled groups. The examination period ranged from 2 to 99 months (mean, about 50 months) in the well-controlled group, whereas the mean was about 15 months in the poorly-controlled group. Our patient's tumor took a comparatively long time to metastasize to the oral region because the primary lesion was well under control for 6 years. In the oral region, the jaw is a common location of metastasis with predilection for the mandible and molar area. As for the probable causes of the occurrence of metastasis, Nakagawa et al. (1991) explained that the pooling of blood in myeloid tissue of the mandible might contribute to the retention of disseminated tumor cells and that the inferior alveolar artery winds its way around the angle of the mandible and in the mental region which causes blood flow to slow down.

Sharp pain and paralysis in the mental region occur as initial symptoms when tumors metastasize to the mandible (Glaser et al., 1997). We should suspect mandibular metastasis when paralysis of the mental region is recognized (Osaki et al., 1978). In our patient, paralysis in the mental region appeared following sharp pain in the mandible. The paralysis hardly improved despite antibiotics, so we carried out the biopsy for definitive diagnosis. Because the molar area of the mandible is a region where metastatic tumors often develop, we should suspect malignant tumor when paralysis of the mental region persists.

In general, metastatic tumors of the oral region are a part of multiple distant metastases and the prognosis is extremely poor: most patients have a fatal outcome of metastasis from the primary tumor within 1 year (Nakagawa et al., 1991; Yajima and Miyazaki, 1999; Kuttan et al., 2006). In making a decision about treatment for metastatic tumor, we should synthetically evaluate clinical manifestations, stage of progress, presence of metastases to other organs and wishes of the patient. In this patient, multiple metastases had already developed extensively when metastatic tumor of the mandible was confirmed. Based on his condition and quality of his life, palliative treatment was unavoidably selected for the oral lesion.

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