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SUPER BONE SCAN due to Bone Marrow Metastases Appearing 19 Years after Surgery for Early Gastric Cancer – A Case Report

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ABSTRACT

A 54-year-old man presenting a so-called super bone scan is reported. The patient had a past history of subtotal gastrectomy due to early gastric cancer 19 years previously. Laboratory data indicated microcytic anemia and high serum alkaline phosphatase. Both the serum calcium and phosphate levels were within normal ranges. In spite of extensive examination for a primary malignant lesion in the organs including the remaining stomach, no solid tumors were identified. Pathological examinations revealed that the tumor cells in the biopsy specimen from the lumbar spine were almost identical to those in the gastric cancer excised 19 years previously. We considered that micrometastases in the bone marrow existed at the time of the initial surgery for gastric cancer and reappeared 19 years later showing super bone scan.

INTRODUCTION

Super bone scan is manifested by a uniform, symmetrically increased bone uptake of tracer with a visually elevated bone to soft tissue activity ratio on bone scintigraphy. Additionally, no renal activity is seen. Metabolic processes such as hyperparathyroidism may be differentiated from diffuse metastasis to the skeleton (1,2) since skeletal metastasis usually involves the axial skeleton with sparing of the extremities, in contrast to metabolic processes which generally are located both in the axial and appendicular skeleton as well as in the skull, mandible, and sternum (3). Saphner et al. described that prostate and breast can-

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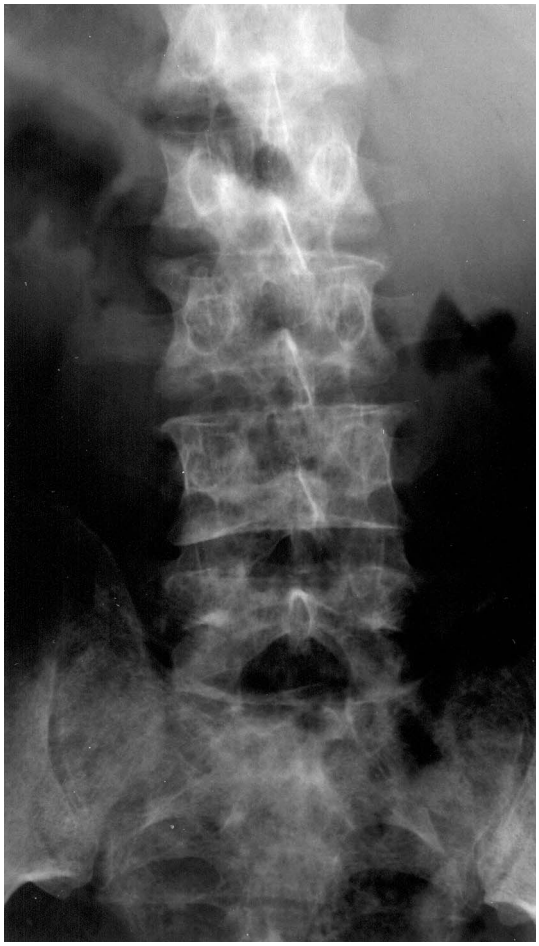

Fig. 1. Plain radiographs showing a mixture of osteosclerotic and osteolytic lesions in the spine without the winking owl sign.

cers are most frequently associated with super bone scans and that his extensive review of the literature from 1966 to 1989 yielded only one case with stomach cancer and symmetrically increased uptake of bone tracer (4). Late recurrence or metastasis of gastric cancer is rare as compared with other cancers such as breast cancer and malignant melanoma. We report a case of general and diffuse bone metastasis showing super bone scan 19 years after subtotal gastrectomy for early gastric cancer.

CASE REPORT

A 54-year-old man visited us in November, 2001 with the chief complaint of intractable middle back pain of two months duration. He had a past history of subtotal

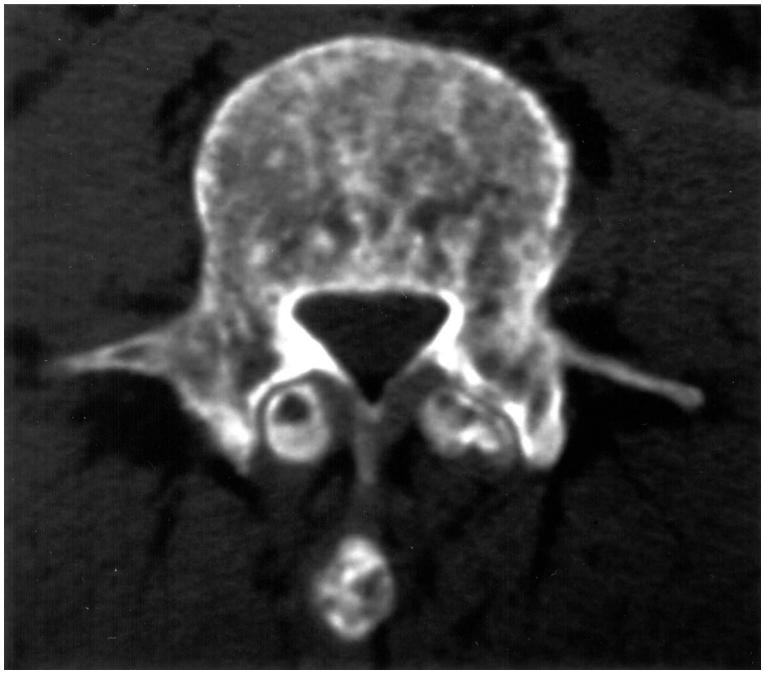

Fig. 2. Computed tomograms showing a mixture of osteosclerotic and osteolytic changes not only in the vertebral bodies but also in the pedicle and the lamina. Similar changes were observed in the spinous process.

gastrectomy due to early gastric cancer in 1982. Since he did not have any particular symptoms, he had not been followed up for the last 18 years. His general condition was good and there was no body weight loss.

At the physical examination, there were no deformities in his spine, nor was there local heat or tenderness. The range of motion in his thoracic to lumbar spine was not restricted. Neurologically, the muscle power in both lower extremities was well preserved and there was no sensory disturbance. The reflexes were also normal.

His laboratory data indicated microcytic anemia (Hb: 8.4g/dl, MCV: 66fl, MCH: 18.5pg) and high serum alkaline phosphatase (ALP) (8600units/liter). Serum calcium (Ca) and phosphate (P) levels were within normal ranges. Liver and renal functions were also normal.

Plain radiographs showed a mixture of osteosclerotic and osteolytic lesions in the whole spine. Winking owl sign due to the osteolysis of the pedicle was not seen (Fig. 1). In the CT images, osteosclerotic and osteolytic changes were seen not only in the vertebral bodies but also in the pedicles and the laminas. Even in the spinous process there were similar changes (Fig. 2). On the T1-weighted MR images, heterogeneous low signal intensities were observed in the entire vertebral bone, including the pedicles and the laminas. These lesions had high signal intensities on the T2-weighted images. Several spots with high signal intensity were seen in the verte-

Fig. 3. Tc-99m MDP bone scintigrams. A strong accumulation of the radiotracer was seen in the whole spine, pelvis, both scapulas, sternum and ribs. On the other hand, no accumulation was seen in the kidney, which could be interpreted as the so-called super bone scan.

bral bodies and spinous processes on T2-weighted images. The whole spine was involved and there was no mass lesion in the spinal canal.

Tc-99m MDP bone scan showed increased uptake in the whole spine, pelvis, both scapulas, sternum and ribs. On the other hand, no increased uptake was seen in the kidney, which could be interpreted as the so-called super bone scan (Fig. 3) (4, 5, 6). Ga-67 scintigram also showed increased uptake in the vertebral bones but not in any internal organs.

In order to rule out metastasis, intensive examinations were carried out. However, no tumors were detected at any sites including the remaining stomach.

To make a histological diagnosis of the bone lesions, needle biopsy was carried out from the pedicle of the fourth lumbar spine. Microscopically, there were a num-

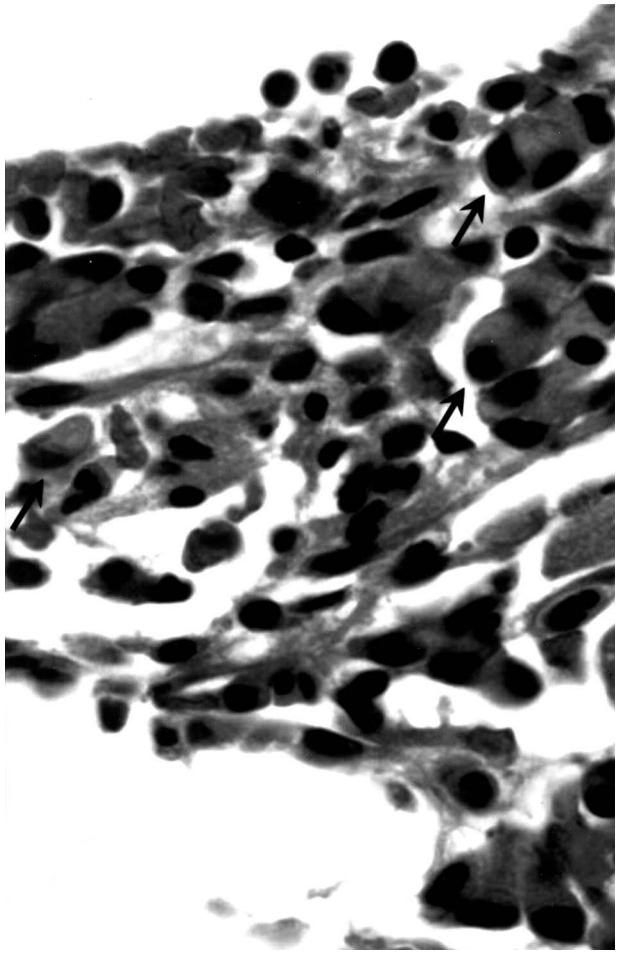

Fig. 4. Pathological findings of the biopsy specimen from the lumbar spine. HE staining, (original magnification, ×200): Small atypical cells with the signet ring cell feature distributing as single cells or in small cell clusters.

ber of small atypical cells with signet ring cell features, intracytoplasmic mucin, and peripherally compressed nuclei. The tumor cells were distributed as single cells or in clusters (Fig. 4). With periodic acid Schiff (PAS) staining, intracytoplasmic mucin in these tumor cells was positively stained. The diagnosis was metastasis of adenocarcinoma.

Retrospective histological examination of the previous gastric cancer removed in 1982 revealed poorly differentiated adenocarcinoma containing signet ring cells (Fig. 5). The tumor cell infiltration reached the submucosal layer, and the diagnosis was early gastric cancer. PAS staining confirmed intracytoplasmic mucin in these gastric carcinoma cells. The histologic findings of the gastric cancer were quite similar to those of the biopsy specimen from the lumbar spine. To compare the tumor

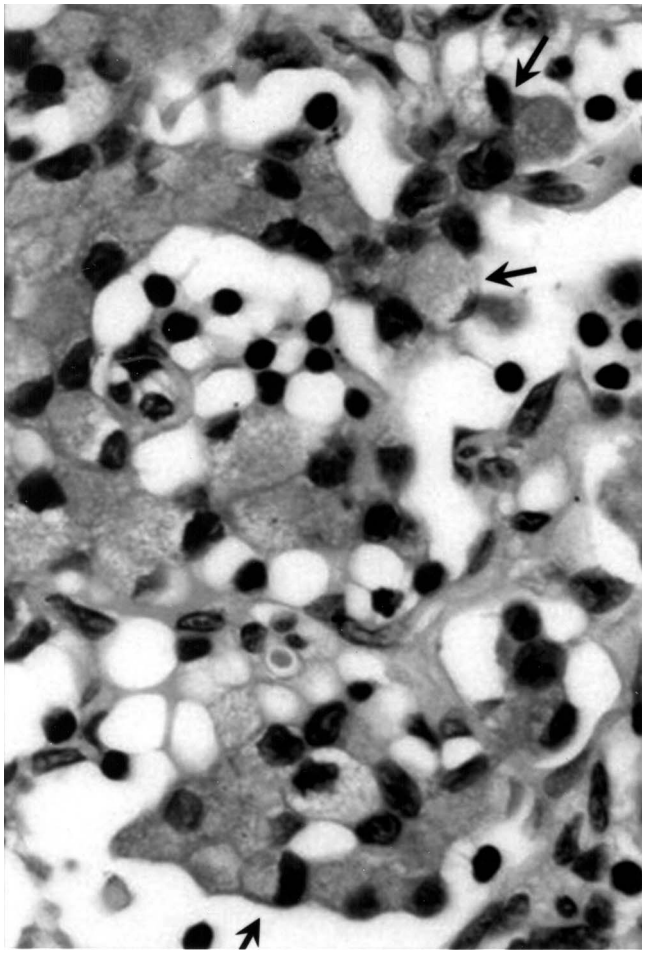

Fig. 5. Histological findings of the gastrectomy specimen from 19 years before. HE staining, (original magnification, ×200).

cell characterizations between these two tumors, immunohistochemical staining was performed, showing an almost identical pattern except for the CA19-9 (Table 1).

The patient's back pain worsened gradually. Chemotherapy or radiation was not selected according to the patient's desire. In July 2002, the patient died of pneumonea. No apparent lung metastasis was found radiologically.

DISCUSSION

In the clinical course of gastric cancer, metastatic lesions in the liver or peritoneum are frequently seen. Only a few reports have been published concerning general and diffuse bone metastasis following gastric cancer, especially appearing several years after surgery (7).

Table 1. Immunohistochemical findings of the biopsy specimen and the gastric tumor (+: positive, –: negative). Note the similarity of the immunohistochemical character between these tumors.

	bone biopsy specimen	gastrectomy specimen
AE1/AE3	+	+
CK7	+	+
CK20	–	–
CEA	+	+
CA19-9	–	+
CA125	–	–

In the present case, no solid tumors were identified in spite of intensive examinations of the major organs including the remaining stomach after recognizing the diffuse bone metastasis in the spine. The pathologic examination revealed that the gastric tumor excised 19 years before and the biopsy specimens from the lumbar spine had almost identical pathologic features. These results strongly suggest that the spinal lesions in the present case were caused by metastasis of the gastric cancer. Maetani et al. reported a similar case with general bone marrow metastasis that appeared 18 years after surgery for gastric cancer (7).

The pathomechanism of metastasis after such long periods remains unknown. However, we infer that in the present case the tumor cells had already metastasized to the bone marrow when the gastric tumor was removed at the time of initial surgery and that the micrometastatic lesions might have suddenly progressed by some unknown cause.

Although the serum Ca and P levels were within normal ranges, the ALP level was extremely high (8600units/liter). Similar data were reported in another case of gastric cancer with super bone scan (6, 8). Tokushima et al. suggested that the cancer cells themselves might produce ALP (7). Further studies are needed to clarify the pathogenesis and pathological roles of ALP in such cases with super bone scan.

From the experience of this case, we believe that metastatic bone marrow tumors should be taken into consideration for the differential diagnosis in cases with a past history of gastric cancer, even when a long period of time has elapsed after the surgery.

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