

Rare Presentation of Early Gastric Carcinoma with Bone and Bone Marrow Metastases: A Case Report

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ABSTRACT

Gastric carcinoma has emerged as a global health problem in recent decades. Bone and bone-marrow metastases are common findings in the diagnostic work-up for malignancies; however, they are rarely seen in early gastric carcinoma. This case report describes a 60-year-old male patient who presented with severe back pain for three weeks. The patient underwent blood tests and radiologic imaging, including abdominal ultrasonography and Computed Tomography (CT) and Magnetic Resonance Imaging (MRI) of the brain and spine, upper Gastrointestinal (GI) endoscopy, gastric biopsy, and bone marrow biopsy. The MRI of the lumbar spine revealed patchy heterogeneous T2 hyperintense signals in multiple vertebrae along with a focal defect at the L2 vertebra. A differential diagnosis of multiple myeloma and bone metastases was initially contemplated. The Histopathological Examination (HPE) of the stomach biopsy indicated poorly differentiated adenocarcinoma exhibiting localised signet-ring cell characteristics. Bone marrow biopsy revealed a similar histopathological picture, confirming metastasis to the bone marrow. A diagnosis of gastric adenocarcinoma with bone and bone-marrow metastases was made. Chemotherapy was deferred due to the patient's poor performance status and, in part, because of worsening cytopenia and Disseminated Intravascular Coagulation (DIC). During the patient's hospital stay, managing the patient's pain, cytopenia, and ongoing DIC became difficult, and the patient succumbed on day 21 of hospitalisation. This case presents an unusual instance of early gastric carcinoma with extensive bone and bone-marrow metastases without visceral or peritoneal involvement.

Keywords: Bicytopenia, Bone metastasis, Bone marrow metastasis, Pathological fracture

CASE REPORT

A 60-year-old male with no prior hospitalisations presented with severe low back pain for three weeks, disrupting his sleep and unrelieved by optimal doses of analgesics. Although there was a recorded weight loss of 11 kg during the previous six months, the patient had no history of dysphagia, melaena, haematemesis, early satiety, or abdominal pain. The patient's systemic examination showed that he was pale, afebrile, alert, and oriented. The patient's vital signs were within normal limits. There were no palpable lymph nodes. The patient's blood investigation report is given below [Table/Fig-1]. The complete haemogram and peripheral blood

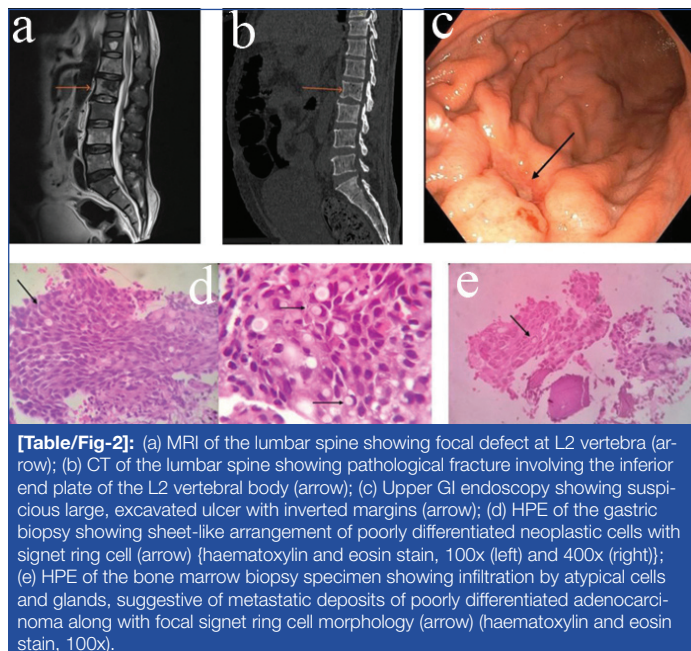
Parameters	Results	Reference range
Haemogram		
Haemoglobin (g/dL)	5.5	13-17
Packed Cell Volume (PCV) (%)	17	14-50
Total leukocyte count (cell/cu.mm)	12,340	4000-11,000
Absolute neutrophil count (cell/cu.mm)	8840	2000-7000
Absolute lymphocyte count (cell/cu.mm)	1370	1000-3000
Absolute eosinophil count (cell/cu.mm)	760	20-500
Absolute basophil count (cell/cu.mm)	20	20-100
Absolute monocyte count (cell/cu.mm)	310	200-1000
Platelets (cell/cu.mm)	59,000	1,50,000-4,10,000
Renal function		
Urea (mg/dL)	29	17-43
Blood Urea Nitrogen (BUN) (mg/dL)	14	6-20
Creatinine (mg/dL)	1.0	0.7-1.3
Electrolytes		
Sodium (mmol/L)	129	136-145
Potassium (mmol/L)	3.8	3.5-5.0

Chloride (mmol/L)	97	98-107
Bicarbonate (mmol/L)	27	21-31
Liver function		
Total bilirubin (mg/dL)	1.73	0.5-1.0
Direct bilirubin (mg/dL)	0.4	Up to 0.3
Indirect bilirubin (mg/dL)	1.33	0.2-0.8
Aspartate aminotransferase (AST) (IU/L)	71	<35
Alanine aminotransferase (ALT) (IU/L)	50	<45
Total protein (g/dL)	5.5	6.6-8.3
Albumin (g/dL)	3.1	3.5-5.2
Globulin (g/dL)	2.5	2.3-3
Alkaline Phosphatase (ALP) (IU/L)	312	30-120
Gamma glutamyl transferase (GGT) (U/L)	24	<55
Viral serology		
Anti-HIV	Non reactive	-
HBsAg	Non reactive	-
Anti-HCV	Non reactive	-
Other		
Amylase (IU/L)	59	22-80
Lipase (U/L)	62	<67
Lactate Dehydrogenase (LDH) (U/L)	1207	125-220
Serum Prostate Specific Antigen (PSA) (ng/mL)	2.0	0-3.5

[Table/Fig-1]: The patient's blood work-up.

smear revealed bicytopenia with severe normocytic normochromic anaemia and thrombocytopenia. The patient's serum iron profile, cobalamin, and folate levels were normal. Stool occult blood was negative, and routine urine and stool analysis did not reveal anything significant. Chest X-ray, electrocardiogram, and echocardiogram

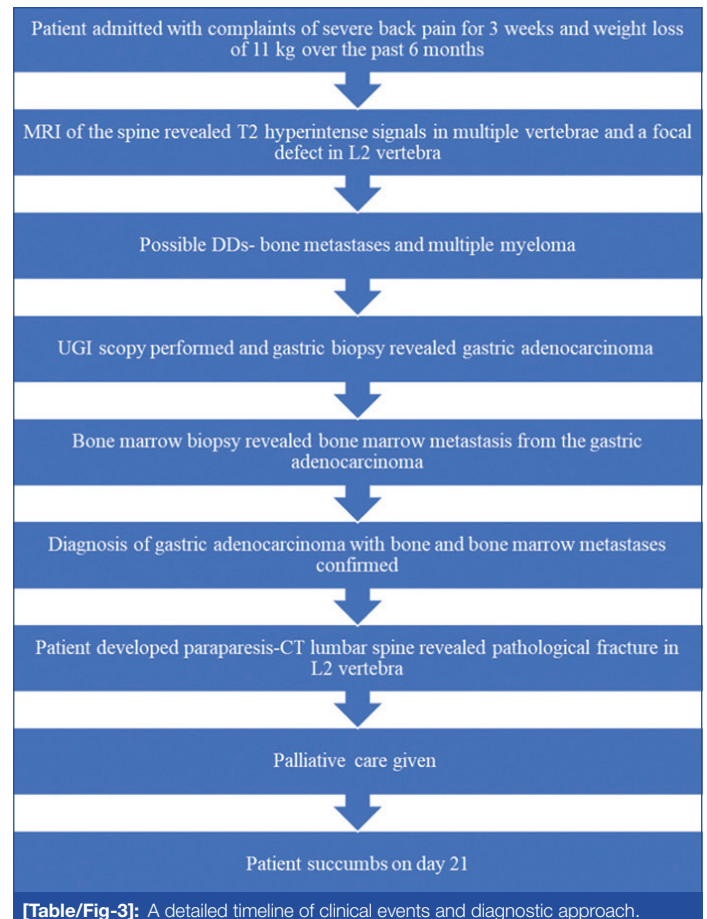
were normal. As the patient had severe back pain, an MRI of the lumbar spine with whole-spine screening was performed and showed patchy heterogeneous T2 hyperintense signals in multiple vertebrae along with a focal defect at L2 vertebra [Table/Fig-2a]. A differential diagnosis of multiple myeloma and bone metastases was considered while proceeding further with the evaluation. Serum protein electrophoresis did not reveal any monoclonal protein peaks. The patient's ultrasound and CT abdomen did not reveal any visceral masses or enlarged lymph nodes. An upper GI endoscopy was performed, and it revealed a suspicious large excavated ulcer with inverted margins at the mid-body along the greater curvature [Table/Fig-2c], from which a biopsy was taken. The HPE of the gastric biopsy specimen revealed an infiltrating neoplasm composed of sheets of poorly differentiated malignant cells, featuring increased nuclear-cytoplasmic ratio, hyperchromatic nuclei, nuclear atypia, inconspicuous nucleoli, and moderate to abundant cytoplasm with focal signet-ring morphology confined to the mucosa and submucosa [Table/Fig-2d]. Furthermore, the HPE of the bone marrow biopsy specimen revealed infiltration by atypical cells and glands with poor differentiation with characteristic focal signet-ring morphology [Table/Fig-2e], suggestive of metastatic deposits of adenocarcinoma. The diagnosis of early gastric adenocarcinoma with bone and bone marrow metastases was confirmed. During the subsequent days of admission, the patient developed paraparesis with acute urinary retention. CT of the lumbar spine performed after the onset of paraparesis showed a pathological fracture involving the inferior end plate of the L2 vertebral body [Table/Fig-2b]. Chemotherapy was considered but was deferred due to an ECOG score of 4 and, in part, due to worsening cytopenia and ongoing DIC. A multidisciplinary palliative approach aimed at improving the patient's quality of life through pain management and prevention of pathological fractures was undertaken. It became challenging to manage the patient's pain, cytopenias, ongoing DIC and end-organ deterioration during his hospital stay. On the 21st day of his stay, he succumbed. A detailed timeline of clinical events and diagnostic approach is given in [Table/Fig-3].



[Table/Fig-2]: (a) MRI of the lumbar spine showing focal defect at L2 vertebra (arrow); (b) CT of the lumbar spine showing pathological fracture involving the inferior end plate of the L2 vertebral body (arrow); (c) Upper GI endoscopy showing suspicious large, excavated ulcer with inverted margins (arrow); (d) HPE of the gastric biopsy showing sheet-like arrangement of poorly differentiated neoplastic cells with signet ring cell (arrow) (haematoxylin and eosin stain, 100x (left) and 400x (right)); (e) HPE of the bone marrow biopsy specimen showing infiltration by atypical cells and glands, suggestive of metastatic deposits of poorly differentiated adenocarcinoma along with focal signet ring cell morphology (arrow) (haematoxylin and eosin stain, 100x).

DISCUSSION

Gastric carcinoma has emerged as a worldwide health problem in the past few decades, ranking fifth in global cancer burden and cancer-related mortality [1]. Gastric carcinoma is known to metastasise to several organs, including the liver, lungs, adrenals, peritoneum, lymph nodes, and ovaries. However, metastases to bone and bone marrow are rare, even in advanced gastric carcinoma, and it is even rarer for these to occur in early gastric



[Table/Fig-3]: A detailed timeline of clinical events and diagnostic approach.

carcinoma or as a primary presentation [2]. Compared with other organ metastases, gastric cancer with bone metastases is associated with lower overall survival, with pain management and prevention of pathological fractures being the main treatment goals, as there are no optimal chemotherapy regimens available [3]. Early gastric carcinoma refers to a cancer that involves only the mucosa or submucosa of the stomach. Compared with Western nations, Eastern countries with national stomach cancer screening programs, such as Japan, have higher rates of detection of early gastric carcinoma [4].

Bone metastases may manifest as hypercalcaemia, pathological fractures, and spinal cord compression. The bone lesions may be osteolytic, osteoblastic, or mixed. The most reported sites of bone metastasis are the spine, ribs, sternum, pelvic bones, scapulae, and skull [5]. In present case, patient presented with back pain, which evolved into paraparesis, signifying spinal cord compression secondary to a pathological fracture in the vertebra, as shown in the CT of the spine taken after the patient developed paraparesis. Serum Alkaline Phosphatase (ALP) and Lactate Dehydrogenase (LDH) levels were also elevated, suggesting the possibility of bone metastasis. When lumbar spine metastases were suspected, an aggressive search for the primary carcinoma began, which ultimately led to the discovery of the gastric adenocarcinoma. Radiological investigations did not reveal any visceral mass or lymphadenopathy, further supporting the idea of direct haematogenous spread to the bones and bone marrow without involvement of local structures or lymphatics. Anatomical features may clarify the mechanism by which stomach cancer metastasises to the bone. A portion of the circulation from the proximal stomach regions may be diverted to the Batson venous plexus, eventually permeating the spine via the azygos and hemiazygos veins [6]. Carcinomas that are large, ulcerated, depressed, or located in the corpus have a higher risk of involving the bone and are more frequently associated with lymph node spread. Among gastric carcinomas, poorly differentiated adenocarcinoma, signet-ring cell carcinoma, and diffuse-type adenocarcinoma are most likely to metastasise to the bone and

bone marrow [7]. In present case, patient was found to have a poorly differentiated adenocarcinoma with focal signet-ring morphology. Present case is rare in that metastases from early gastric carcinoma are confined to the bones and bone marrow without involving other organ systems. The most typical haematological manifestation of gastric adenocarcinoma with bone marrow metastasis is thrombocytopenia [8]. Gastric adenocarcinoma has also been reported to present with bicytopenia as a rare primary manifestation. Bone marrow metastasis can also present as DIC, microangiopathic haemolytic anaemia, and leukoerythroblastosis [9]. Bone marrow involvement, although rare, has been reported in gastric adenocarcinoma and is more frequently seen in the fifth decade, typically associated with widespread bone involvement. The bone marrow biopsy of index patient revealed infiltration by malignant cells.

The literature on similar published cases has demonstrated that gastric carcinomas with aggressive histopathology (poorly differentiated or signet-ring cell carcinoma) are more likely to metastasise to bone and bone marrow, sometimes without involving other organ systems such as the peritoneum or lymph nodes. Most of these patients received palliative treatment, with some receiving chemotherapy and palliative surgery, and most succumbed to the illness within weeks to months of diagnosis [Table/Fig-4] [10-18].

The treatment options for patients with metastatic gastric carcinoma include palliative surgery and chemotherapy. The goals of chemotherapy are to palliate symptoms, improve quality of life, and prolong overall survival. Initial chemotherapeutic options for metastatic gastric carcinoma include the FOLFOX and CAPOX regimens. Other alternatives include modified FLOT and FOLFIRI regimens. The treatment must be individualised based on staging, histopathology, immunohistochemistry, and the patient's overall performance status. Emerging treatment options include single-agent immunotherapy, anti-angiogenic drugs, dual checkpoint inhibitors, and biomarker-directed therapies [19].

Metastatic gastric carcinoma has a poor prognosis. Mikami J et al., and Turkoz FP et al., concluded that gastric carcinoma with bone and bone marrow metastases carried a poor prognosis and was associated with poor overall survival [2,20]. The SEER database analysis by Dong Q et al., concluded that the overall survival of gastric carcinoma with bone metastasis was worse than that of patients with liver or lung metastases and was almost comparable with that of patients with brain metastases [21]. The overall survival of patients with single-site metastasis was better than that of patients with multiple-site metastases.

The clinical pearls and learning points in this case report are that, although bone and bone marrow metastases in advanced gastric carcinoma are frequently reported, they are rare in early

S. No.	Author name and year of study	Presentation	Diagnosis	Treatment and outcome	Similarities and dissimilarities
1	Ekinci AŞ et al., (2014), [10]	Five patients of advanced gastric carcinoma with bone marrow metastasis.	Four patients had both anaemia and thrombocytopenia, and one patient had only thrombocytopenia. Three patients had signet-ring cell type, one had undifferentiated type, and one had tubular type tumour.	Two patients received chemotherapy after the diagnosis of bone marrow metastasis. The range of survival duration after diagnosis of bone marrow metastasis was 20–53 days among the 4 patients who died; 1 patient was alive at 61 days after diagnosis.	Similarities- bone and bone marrow metastases. Signet ring cell carcinoma and patient outcome. Dissimilarities- The patients had advanced gastric carcinoma unlike our patient who had early gastric adenocarcinoma.
2	Gomi D et al., (2018), [11]	Case 1- no symptoms, markedly increased Alkaline Phosphatase (ALP). Case 2-Swelling in the right Carpometacarpal (CMC) joint of the thumb.	Case 1- signet ring cell carcinoma. Case 2-tubular adenocarcinoma.	Case 1- chemotherapy (cisplatin + S-1). Patient succumbed 2 years after diagnosis. Case 2- radiotherapy and chemotherapy (cisplatin + S-1). Patient remained alive after 2 years and was on S-1 maintenance therapy.	Similarities- Signet ring cell carcinoma and patient outcome. Dissimilarities-metastasis to trapezius. No bone marrow involvement.
3	Kawahigashi T et al., (2019), [12]	Lower limb weakness and acute retention of urine secondary to metastatic spinal cord compression. No Gastrointestinal symptoms.	Magnetic resonance imaging of the entire spine revealed multiple bone metastases in almost all vertebral bodies. Contrast-enhanced CT scan of the thorax, abdomen and pelvis showed a thickened gastric wall, multiple lymphadenopathies around the stomach, the para-aortic lesion and peritoneal dissemination, and ascites. Esophagogastroduodenoscopy showing the scirrhous type gastric cancer on the posterior wall of the middle body.	Patient was treated with systemic steroids, radiotherapy and decompression laminectomy. Patient succumbed on 44 th day of admission.	Similarities-presented with paraparesis and urinary retention, poorly differentiated adenocarcinoma and patient outcome. Dissimilarities-scirrhous type gastric cancer with metastases to lymph nodes and peritoneum which indicates that the bone metastasis has occurred later in the course of the illness. No bone marrow involvement.
4	Fujita I et al., (2020), [13]	Back pain and anorexia for two weeks.	PET/CT- revealed focal uptake in the lesser curvature of the stomach and in the spinal bone, pelvic and thigh bone. Esophagogastroduodenoscopy revealed a 10 mm slightly elevated lesion with a central depression in the middle-third of the stomach. Gastric and bone biopsy revealed signet-ring cell carcinoma	The patient received first-line chemotherapy with S-1 and cisplatin, and second-line chemotherapy with nab-paclitaxel. The patient died 120 days after consultation.	Similarities-presented with severe back pain, signet-ring cell carcinoma and patient outcome. The rate of metastasis exceeded the growth rate of the primary lesion with early metastasis to bone. Dissimilarities-no bone marrow involvement
5	Aiba H et al., (2022), [14]	Chronic low back pain. History of gastric cancer 2 years prior for which the patient underwent partial gastrectomy	Gastric and bone biopsy revealed poorly differentiated adenocarcinoma with signet cell morphology	Chemotherapy- tegafur + gimeracil + oteracil potassium subcutaneous injection of denosumab (120 mg, monthly) Outcome-patient improved with treatment	Similarities-presented with severe back pain, poorly differentiated adenocarcinoma with signet cell morphology in gastric biopsy Dissimilarities-Chronic clinical course. No bone marrow involvement or cytopenia. Patient improved with chemotherapy

6	Barbosa-Martins J et al., (2022), [15]	Back pain, malena, anorexia and weight loss	Gastric biopsy- Signet ring cell adenocarcinoma Bone biopsy- Signet ring cell adenocarcinoma	Patient succumbed on day 60	Similarities-presented with severe back pain. Signet ring cell carcinoma. patient outcome
6	Ashikian TA et al., (2024), [16]	Back pain	Gastric biopsy-poorly differentiated adenocarcinoma	Patient succumbed within 3 months	Similarities-presented with severe back pain, poorly differentiated adenocarcinoma and patient outcome. Dissimilarities-no bone marrow involvement.
8	Palo A et al., (2025), [17]	Severe anaemia and thrombocytopenia.	Intestinal type of adenocarcinoma	Palliative care. Patient succumbed within 2 months of diagnosis	Similarities- Early bone marrow involvement without any visceral or peritoneal spread. patient outcome. Dissimilarities-no bone metastases.
9	Jin CB et al., (2025), [18]	Worsening generalised joint pain and severe back pain.	PET/CT- Revealed extensive bone metastasis and increased uptake in gastric antrum. Gastroscopy- revealed an ulcerated mass in the prepyloric region, and histopathological evaluation of the biopsy specimen revealed poorly differentiated adenocarcinoma.	The patient refused treatment and succumbed 1 year later.	Similarities-presented with severe back pain. Poorly differentiated adenocarcinoma Patient outcome. The rate of metastasis exceeded the growth rate of the primary lesion with early metastasis to bone. Dissimilarities-Chronic clinical course and without bone marrow involvement.
10	Dhas AJ et al., 2025	Severe back pain for three weeks and weight loss of 11 kg over six months. Paraplegia and acute retention of urine. Severe anaemia with thrombocytopenia.	MRI of lumbar spine- bone metastases involving multiple vertebrae, with focal defect at L2 vertebra. Upper GI endoscopy- suspicious large, excavated ulcer with inverted margins. Gastric and bone marrow biopsy- Poorly differentiated early gastric adenocarcinoma with focal signet ring morphology.	Palliative care given. Patient succumbed on day 21.	Early gastric carcinoma with bone and bone marrow metastases.

[Table/Fig-4]: Shows the differences between the current case and other documented cases of gastric carcinoma with bone and/or bone marrow metastases. It does this by looking at the clinical presentation, histology, treatment, outcomes, and differences [10-18].

gastric carcinoma. While bone metastasis can present in various ways, nocturnal back pain that awakens the patient from sleep warrants rigorous investigation with a high index of suspicion for bone metastasis. Bone marrow metastasis should be considered in the presence of bicytopenia. Since tumour markers, serum ALP, and LDH are not always elevated, a thorough evaluation using appropriate modalities—including MRI, PET-CT scans, and biopsies—may be required.

CONCLUSION(S)

This case highlights the atypical nature of early gastric carcinoma presenting with bone and bone marrow metastases in the absence of overt gastrointestinal symptoms or advanced primary tumour characteristics. Such atypical presentations underscore the importance of maintaining a high index of suspicion for metastatic disease in patients with unexplained haematologic abnormalities or bone pain, even when a gastrointestinal primary is not clinically evident. Aggressive histopathology, such as poor differentiation or signet-ring cell morphology, is associated with early dissemination, which in this case likely contributed to the unusual metastatic pattern. Early recognition through a multidisciplinary approach and timely diagnostic interventions can significantly influence patient management and prognosis, despite the aggressive and often silent course of metastatic gastric cancer.

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