Successful Treatment of Duodenal Myeloid Sarcoma with Allogeneic Bone Marrow Transplantation and Additional Radiotherapy

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Abstract

Myeloid sarcoma (MS) is a tumor consisting of myeloid blasts that occurs at an anatomical site other than the bone marrow. We report the case of a 38-year-old man with duodenal MS who underwent an allogeneic bone marrow transplant in a non-complete remission (CR) state. After the transplant, residual disease was suspected on a fluorodeoxyglucose positron emission tomography (FDG-PET)/CT scan, and additional radiotherapy resulted in CR, which has been maintained for 21 months. FDG-PET/CT scanning is useful for evaluating residual myeloid sarcoma during the peritransplant period.

Key words: myeloid sarcoma, bone marrow transplantation, FDG-PET/CT

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Introduction

Myeloid sarcoma (MS), which is also known as chloroma, is a tumor consisting of myeloid blasts with or without maturation that occurs at an anatomical site other than the bone marrow. Almost all parts of the body can be affected, and the skin, lymph nodes, gastrointestinal tract, bone, soft tissue, and testes are the most frequently affected sites (1). The small intestine is reported to be the primary site of MS in approximately 11% of cases (2). MS can occur as an isolated lesion in non-leukemic patients. This type of lesion usually progresses to disseminated marrow disease and, like acute myelogenous leukemia (AML), should be treated with systemic chemotherapy. Herein, we report a case of duodenal MS in a non-leukemic patient. The patient’s MS persisted after three courses of chemotherapy and thus allogeneic bone marrow transplantation (allo-BMT) was performed with the patient in a non-CR state. After the transplant, a residual mass was suspected on FDG-PET/CT scans, and additional radiotherapy resulted in a long-term CR.

Case Report

A 38-year-old man with duodenal MS was referred to our hospital for allo-BMT at the end of September 2009. He had suffered from abdominal pain in January 2009 and was admitted to a nearby hospital for two weeks. Based on a diagnosis of a suspected gastric ulcer, he underwent Helicobacter pylori eradication, but his symptoms worsened. He complained of severe abdominal pain, and peritonitis combined with ileus was suspected. He was re-admitted to the same hospital at the end of March 2009. A CT scan detected a duodenal mass, and laparotomy revealed duodenal tumors, ascites, and swollen mesenteric lymph nodes. Since hematoxylin and eosin (H&E) stained sections of the duodenal tumors showed the diffuse infiltration of large lymphocyte-like cells, malignant lymphoma was suspected. He was transferred to the hematology department of another public
MS is a tumor consisting of myeloid blasts with or without maturation that occurs at an anatomical site other than the bone marrow. It might precede or coincide with AML or represent acute blastic transformation of myelodysplastic syndrome (MDS), myeloproliferative neoplasms (MPN), or MDS/MPN (1). In most cases, local therapy is insufficient, and the administration of antileukemic chemotherapy soon after diagnosis is associated with longer survival and a significantly lower risk of AML (4). Previous reports have described patients with chemoresistant MS or MS with an unfavorable prognosis who were treated with allo-HCT (5-11).

Figure 1. CT scan performed at the end of April 2009 showing a duodenal mass (arrow) and slight ascites.

Figure 2. Upper gastrointestinal endoscopy performed before the chemotherapy showing duodenal tumors.

hospital. The superficial lymph nodes, liver, and spleen were not palpable. Laboratory studies revealed that there were no abnormal cells in his peripheral blood or bone marrow, and lactate dehydrogenase (LDH) 296 IU/L (normal range (NR) 142-246) was slightly elevated. A CT scan detected tumors in the third portion of the duodenum and jejenum, swollen mesenteric lymph nodes, and slight ascites (Fig. 1). Upper gastrointestinal endoscopy also revealed a mass in the third portion of the duodenum (Fig. 2). Systemic chemotherapy with the CHOP regimen was started from the beginning of May 2009. However, the pathological diagnosis of the previous hospital was changed to MS because immunophenotypic studies demonstrated positive staining for myeloperoxidase, CD34, CD45m, and lysozyme, whereas immunohistochemical tests for CD3, CD20, CD56, and CD79a were negative. His chemotherapy was changed to induction chemotherapy performed according to the JALSG AML-95 protocol (idarubicin hydrochloride, and cytarabine) (3), and two courses of consolidation chemotherapy performed according to the same protocol were added. The first course involved mitoxantrone hydrochloride and cytarabine, and the second course involved daunorubicin hydrochloride, etoposide, enocitabine, and 6-MP. Although appreciable tumor regression (40×40 mm in size) and disappearance of significantly swollen mesenteric lymph nodes were observed on CT, and LDH decreased to 157 IU/L (NR 142-246), FDG-PET/CT scans revealed a significant uptake in the third portion of the duodenum (maximum standardized uptake value (SUV max): 4.3) (Fig. 3a), therefore he was transferred to our hospital for allo-BMT. At this point, histological confirmation of the residual MS was not performed, because the upper gastrointestinal endoscopy performed after the first consolidation chemotherapy did not reveal any abnormal tumors in the duodenal mucosa.

He underwent allo-BMT from a HLA completely matched unrelated donor in a non-CR state in the middle of October 2009. The conditioning regimen consisted of 60 mg/kg cyclophosphamide i.v., once daily, for 2 days (from day -7 to day -6, total dose: 120 mg/kg) and total body irradiation (TBI) (from day -3 to day 0, total: 12 Gy). The graft-versus-host disease (GVHD) prophylaxis consisted of a short course of methotrexate and cyclosporine (CyA), which was delivered via a continuous intravenous infusion from 1 day before the BMT. The patient received G-CSF (300 μg/m² filgrastim i.v., once daily) from day 5 to day 17. He had febrile neutropenia on day 6, but it was successfully treated with meropenem hydrate and vancomycin hydrochloride. His hematologic recovery was prompt, and there were no signs of acute GVHD. An FDG-PET/CT scan performed on day 40 revealed slight uptake in the third portion of the duodenum (SUV max: 2.09) (Fig. 3b), suggesting residual sarcoma. A CT scan on day 45 revealed the regressed, but residual sarcoma (25×11 mm in size) and no significantly swollen lymph nodes. Radiotherapy (total: 27 Gy/15 fr) for this lesion was performed from day 49 to day 70. There were no symptoms of GVHD after the beginning of radiotherapy. An FDG-PET/CT scan performed on day 133 showed no uptake (Fig. 3c). Although WT-1 mRNA of peripheral blood, which was not evaluated before the additional radiotherapy, fluctuated between negative and 8.83×10⁻⁵ (WT-1 expression level in K562 leukemic cells was defined as 1.0) after the radiotherapy, he currently remains alive and well with no evidence of recurrent MS or leukemia at 21 months after the completion of his treatment.

Discussion

MS is a tumor consisting of myeloid blasts with or without maturation that occurs at an anatomical site other than the bone marrow. It might precede or coincide with AML or represent acute blastic transformation of myelodysplastic syndrome (MDS), myeloproliferative neoplasms (MPN), or MDS/MPN (1). In most cases, local therapy is insufficient, and the administration of antileukemic chemotherapy soon after diagnosis is associated with longer survival and a significantly lower risk of AML (4). Previous reports have described patients with chemoresistant MS or MS with an unfavorable prognosis who were treated with allo-HCT (5-11).
In some cases involving a large mass or multiple lesions, long-term survival was achieved by performing the transplant with the patient in a non-CR state; however, these lesions make accurate evaluation of the extent of any residual disease remaining after chemotherapy difficult (7-9).

On the other hand, some case reports demonstrated that MS relapsed after allo-HCT for leukemia (12, 13). Xu et al reported the case of a patient who presented with extra- and intracranial MS after undergoing a transplant for chronic myelogenous leukemia. The patient was successfully treated with surgical resection and postoperative radiotherapy and chemotherapy (12). Kai et al reported the case of a patient with acute promyelocytic leukemia who suffered serial extramedullary MS relapses after undergoing allogeneic peripheral blood stem cell transplantation (allo-PBSCT). This patient was successfully treated with arsenic trioxide in combination with local radiotherapy (13). These reports suggest that appropriate local or systemic salvage therapies can result in a good prognosis for relapsed MS, even after allo-HCT; and therefore, careful observation of MS is necessary in the peritransplant period.

Ueda et al evaluated the diagnostic tools available for detecting MS and reported that FDG-PET was more effective than, or at least equivalent to, the other diagnostic tools at detecting MS in six patients, but was less effective in one patient (14). Aschoff et al evaluated the potential role of FDG-PET/CT in the management of MS and reported that changes in FDG uptake after treatment might be useful for monitoring MS patients (15). In the present case, FDG-PET/CT scanning aided our decision making: we chose to perform the transplantation with the patient in a non-CR state because an FDG-PET/CT scan detected a residual duodenal MS before the transplant. After the allo-BMT, additional radiotherapy was considered to be necessary because further residual disease was suspected on an FDG-PET/CT scan.

Myeloid sarcomas are extremely radiosensitive; however, the optimal dose of irradiation has not been established. Although the literature is limited regarding the maximum dose needed for treatment of myeloid sarcomas, it appears that 30 Gy is the maximum required for local control (16). The present patient had been treated with TBI as a part of the conditioning regimen, a slightly reduced dose (27 Gy) was added to the duodenal mass. The radiotherapy resulted in a CR, which has so far lasted for 21 months. However, the
role of additional radiotherapy after allo-HCT has not been clearly determined because there have been previous cases in which residual masses were suspected after allo-HCT and a CR was confirmed at 9 months (9) or a few years (11) after the allo-HCT without additional therapy. More cases should be studied in order to evaluate the role of FDG-PET/CT in decision making during the treatment of MS and the application of radiotherapy after allo-HCT.

We report the case of a patient with duodenal MS who was successfully treated with allo-BMT and additional radiotherapy. Although the follow-up period might not be sufficient to confirm that the patient’s disease has been completely cured, our case suggests that FDG-PET/CT scanning is useful for evaluating disease status during the peri-transplant period, and additional radiotherapy for suspected residual disease after allo-HCT should be considered as a therapeutic option when FDG-PET/CT suggests that residual disease is present.

The authors state that they have no Conflict of Interest (COI).

References


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