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CASE REPORT

Myelodysplastic hematopoiesis mimicking the bone marrow in a mediastinal myelolipoma

Hina Takano[1], Ken Takahashi[2] & Kazuhiro Taki[3]

[1]Department of Hematology, Japan Red Cross Musashino Hospital, Tokyo, Japan
[2]Department of Thoracic Surgery, Japan Red Cross Musashino Hospital, Tokyo, Japan
[3]Department of Pathology, Japan Red Cross Musashino Hospital, Tokyo, Japan

Correspondence
Hina Takano, Department of Hematology, Japan Red Cross Musashino Hospital, 1-26-1 Kyonan-cho, Musashino, Tokyo 180-8610, Japan. Tel: 81-422-32-3111; Fax: 81-422-32-9551; E-mail: inuinu@musashino.jrc.or.jp

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Key Clinical Message

Myelolipoma is one of the rare causes of posterior mediastinal tumor. Surgical excision is effective, which differs from the treatment of extramedullary disease usually concomitant with myelodysplastic syndrome. Cytogenetic analysis suggests the bone marrow cell originating myelolipoma.

Keywords

Extramedullary disease, hematological neoplasm, mediastinal tumor, myelodysplastic syndrome, myelolipoma.

Introduction

There are wide varieties of diseases that cause mediastinal tumors. However, the differential diagnosis of the mediastinal tumors closely relates to the anatomic location. Neurogenic tumor is the most common cause of the posterior mediastinal tumor, but bronchogenic cyst, enteric cyst, diaphragmatic hernia, meningocele, and paravertebral abscess may occur [1]. One of the rare causes of posterior mediastinal tumor is extramedullary hematopoiesis (EMH), which is well recognized in congenital hemolytic anemia [2, 3]. EMH is classified as myelolipoma when fat tissue is predominant, lymphocytes, especially when aggregates are present, when erythroid hyperplasia is absent, or the tumor is solitary, but there is no clear distinction between the two diseases, and the pathogenesis of myelolipoma remains unclear [4]. Up to now, there are approximately twenty-five reports of mediastinal myelolipoma found in the literature [5, 6]. To the best of our knowledge, this is the first report of mediastinal myelolipoma associated with myelodysplastic syndrome (MDS) documenting the relation with the hematopoiesis of the bone marrow.

The images in Figure 1A and B show stump samples of a mediastinal tumor and bone marrow, respectively, obtained from the same patient. The tumor was determined to be a myelolipoma of the posterior mediastinum, and the patient was diagnosed with MDS. These images are very similar, making it difficult to determine the origin of the tissues. The similarity of the two tissues supports the hypothesis that bone marrow cell migration is involved in the histogenesis of myelolipoma.

This case also represents an unusual extramedullary involvement in a patient with MDS.

Case Report

A tumor was found incidentally in the posterior mediastinum of a 73-year-old man when he was treated for pneumonia. The blood test showed mild anemia with hematocrit 25.7% (normal rage 38–52%), hemoglobin level 12.3 g/dL (normal range 13–18 g/dL), red cell count 3,840,000 per mm^3 (normal range 4,000,000–5,500,000 per mm^3), platelet count 88,000 per mm^3 (normal range

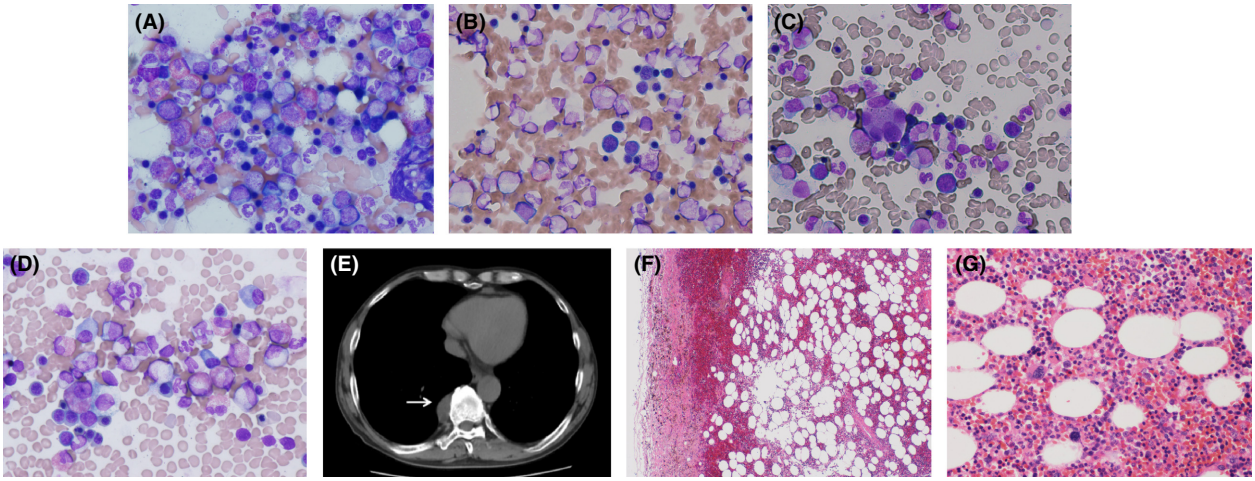

Figure 1. Hematopoietic cells shown by the touch imprint of the tumor (A) and bone marrow (B). Erythroblasts with megaloblastic changes and an increased number of eosinophils can be observed in both samples (May–Grunwald–Giemsa staining, 200 ×). (C, D) Bone marrow smear showing the dysplastic features of megakaryocytes (C) and erythrocytes (D) (May–Grunwald–Giemsa staining, 200 ×). (E) Computed tomography of the chest with the tumor (white arrow) in the right posterior mediastinum. (F, G) Hematoxylin- and eosin-stained sections demonstrating a robustly encapsulated tumor containing adipocytes and hematological tissue (F, 4 ×) and bone marrow elements with trilineage hematopoiesis and an increased number of eosinophils (G, 20 ×).

Table 1. Differential count* of bone marrow smear and tumor stump sample.

Cell type	Bone Marrow (%)	Tumor (%)
Neutrophilic series (total)	48.2	38.4
Myeloblast	2.0	1.6
Promyelocyte	0.2	2.0
Myelocyte	3.2	7.0
Metamyelocyte	13.6	7.4
Band	12.2	10.4
Segmented	17.0	10.0
Eosinophilic series (total)	5.2	8.8
Basophilic series (total)	0.2	6.6
Erythrocyte series (total)	35.6	32.8
Lymphocytes	5.6	8.2
Plasma cells	1.4	0.4
Monocytes	3.0	4.6
Megakaryocytes	0	0
Reticulum cells	0.8	0.2
Myeloid to erythroid ratio	1.51	1.64

*Differential count was carried out by examining 500 nucleated cells in the May/Grunwald/Giemsa-stained samples.

160,000–410,000 per mm^3), and white cell count 7000 per mm^3 (normal range 3800–8500 per mm^3); the white cells consisted of 58.3% neutrophils (normal range 40–70%), 9.0% lymphocytes (normal range 15–40%), and 25% eosinophils (normal range 0–7%). A bone marrow smear (Fig. 1C and D) revealed dysplastic megakaryocytes and erythrocytes, but the number of blast cells was not increased (Table 1). This was in accordance with the MDS diagnosis (refractory cytopenia with multilineage dysplasia). Computed tomography revealed that the tumor was oval shaped, 38 mm in diameter, and clearly encapsulated (Fig. 1E). By magnetic resonance imaging, the tumor lesion showed moderate signal intensity both on T1-weighted and on T2-weighted signal. As the radiographic findings were not typical for neurogenic tumors, the tumor was surgically removed. Pathologically, the tumor was composed of fat and hematopoietic tissues with trilineage cells in different developmental stages, and it was diagnosed as myelolipoma (Fig. 1F and G). A differential count of the tumor stump sample demonstrated that it was composed of 53.8% myeloid cells, 32.8% erythroid cells, and 8.2% lymphoid cells. This was similar to the bone marrow sample, which comprised 53.6% myeloid cells, 35.6% erythroid cells, and 5.6% lymphoid cells. A mild increase in the number of eosinophilic cells was also observed in both tissues (Table 1). Surface antigen screening of the tumor cells was performed using flow cytometry method and confirmed the existence of myeloid lineage (CD13- and CD33-positive) cells, erythroid lineage (glycophorin A-positive) cells, megakaryocyte lineage (CD41-positive) cells, B lymphocytes (CD19-positive), and T lymphocytes (CD3-positive), without the expansion of immature CD34-positive cells. Chromosome analysis by the G-banding method showed complex abnormalities (46, XY, −2, −7, der (11)add(11)(p11.2) add(11)(q23), add(12)(q13), del(20)(q11. 2q13.3), +mar1, +mar2) in 19 of 20 cells examined, which was observed after analyzing the bone marrow cell as well. The tumor

was solitary and it was completely removed; there was no evidence of recurrence 3 years after surgery.

Discussion

Here, we presented an atypical case of extramedullary disease in a patient with MDS. Compared with leukemia, the manifestation of extramedullary disease is infrequent in MDS, and tumors develop only occasionally. Generally, these tumors consist of immature cells of the myeloid lineage and are often described as myeloid sarcoma. It may be the first sign of leukemia and often shows poor prognosis, whether by lack of effective therapy or by transformation to leukemia in many cases. The most commonly involved sites are skin, bone, and lymph nodes [7]. From the previous reports, we were able to find only one case of mediastinum myeloid sarcoma associated with MDS [8]. In the case presented here, the tumor was solitary and contained differentiated myeloid cells in various developmental stages, as well as significant amounts of adipocytes and lymphocytes, and was therefore diagnosed as myelolipoma.

Myelolipoma is a rare benign tumor typically found in the adrenal gland, with rare extra-adrenal cases. In these rare cases, lesions tend to be presacral, but they can occur in many locations [4, 9–15]. Only a few studies reported mediastinal myelolipoma cases and the majority of them were found in the posterior mediastinum [5, 16]. Because of the rarity of myelolipomas, a definitive diagnosis using only radiographic studies is difficult, and some myelolipomas may become extremely large [16]. However, most mediastinal myelolipomas are removed surgically without recurrence [5], which is in contrast to the prognosis of extramedullary disease of MDS.

There are several hypotheses regarding the origin and pathogenesis of this tumor, such as that it arises from the metaplasia of stromal cells [17] or the remnants of primitive fetal mesenchymal cells [4]. These cells may serve as niche cells for the migration of bone marrow cells [18]. As concomitant endocrine disorders and hemolytic anemia are often observed, prolonged hormone- [17] and erythropoietin-induced [10] hyperstimulation of these cells may contribute to tumor growth. Nonrandom X chromosome inactivation [19] and cytogenetic abnormalities [18] may explain the neoplastic characteristics of this tumor. In this case, the clonal chromosomal abnormalities detected in myelolipoma were identical to those detected in the bone marrow cells, indicating the bone marrow origin and neoplastic expansion of this tumor.

Conflict of Interest

None declared.

Authorship

HT: She is the hematologist for the diagnosis of MDS and also responsible for this manuscript. KT: He was responsible for the surgical resection of the mediastinal tumor. KT: He was the pathologist for the diagnosis of myelolipoma and MDS.

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