Granulocytic sarcoma is an unusual variant of myeloid malignancy in which there is an extramedullary tumor mass composed of myeloblasts or myeloblasts and more mature neutrophils. It rarely occurs in mediastinum and clinically may resemble a mediastinal lymphoma. We report a patient who was initially diagnosed as malignant lymphoma based on the previous biopsy specimen. The diagnosis of granulocytic sarcoma is not difficult with careful histopathologic evaluation and immunohistochemical staining.

**Key words:** Granulocytic sarcoma, chloroma, myeloid sarcoma
deniz University. The paraffin-embedded blocs were referred to Pathology Department of Akdeniz University for a second opinion. Histologically, there were sheets of immature cells and the cells had round and oval nuclei with scanty cytoplasm. It had a delicate nuclear chromatin pattern with thin, regular nuclear membrane, and one or more small basophilic nucleoli (Figure 1). These cells stained positively with leukocyte common antigen (LCA), CD68, CD43. But antibodies for specific T cells (CD3, CD5, CD2) and B cells (CD20, CD79a) antigens did not stain. Because of CD68 and CD43 positivity, the sections were further stained with CD30, ALK-1 and myeloperoxidase to exclude lymphoma. Myeloperoxidase was positive (Figure 2). AKL-1 and CD30 were negative. No cytoplasmic granules could be recognized in a thin Giemsa section. The tumor was diagnosed as granulocytic sarcoma. The patient had been misdiagnosed as a lymphoma. A bone marrow aspirate and trephine biopsy, taken a month later, showed normal cellularity and no lymphomatous infiltrate.

The bone marrow aspiration showed hypercellularity with diffuse infiltrating blasts. Treatment was started with induction chemotherapy consisting of daunorubicin and cytosinarabinosid. The bone marrow aspirate one month later showed no infiltration. Eight weeks after chemotherapy, she was readmitted with cardiac failure and died of cardiopulmonary arrest.

**DISCUSSION**

Granulocytic sarcoma is an unusual variant of myeloid malignancy in which there is an extramedullary tumor mass composed of myeloblasts or myeloblasts and more mature neutrophils. GS may occur as an isolated finding or may be associated with acute myeloid leukemia, chronic myeloid leukemia, chronic idiopathic myelofibrosis, hypereosinophilic syndrome, and polycythemia vera (7). GS is reported in 0.7-9.0 percent of patients with acute or chronic myelogenous leukemia (8). The mediastinal mass is an unusual site of presentation and clinically resemble a mediastinal lymphoma (9,10). The diagnosis of GS is not difficult when the tumor is grossly green in color, which is due to the presence of peroxidase in leukemic cells or shows relatively well-differentiated granulocytes in touch prints. However, granulocytic sarcomas occurring as isolated lesions in the absence of some type of leukemia may be misdiagnosed, as a malignant lymphoma-large cell type or poorly differentiated tumors. The higher rate of misdiagnosis is probably a reflection of the rarity of this lesions and low index of suspicion. Histopathologic classification has generally resulted in three levels of differentiation: blastic, imma-
ture, and differentiated. The blastic type is composed primarily of myeloblasts. The myeloblasts have a slight to moderate rim of basophilic cytoplasm, fine nuclear chromatin and two to four nucleoli. Eosinophilic myelocytes are not usually found. The immature type with an intermediate degree of differentiation contains principally myeloblasts and promyelocytes. The differentiated type primarily consists of promyelocytes and cells in their later stages of maturation. The diagnosis of GS in nonleukemic patients is extremely difficult without using immunohistochemical staining. The immunophenotype is identical to that of a myeloid leukemia being negative for B and T cell markers but positive for myeloperoxidase and/or histiocytic markers such as lysozyme or CD68. Similarly, immunoreactivity for CD13, CD15, CD33 is expected in GS but not lymphoma. Other markers which may be positive include CD31, CD34 and CD43 and these can be misleading as they are not lineage specific. For example, CD43 positivity may suggest a T-cell lymphoma but higher index of suspicion for a T-cell lymphoma lacking all other T-cell markers should be maintained. The use of antibodies against CD34, which is expressed in acute leukemias, may provide a useful addition to a panel of antibodies in these cases, facilitating identification of cells of myeloid origin excluding lymphoma (11).

Due to poor fixation and preparation, histopathologic diagnosis is difficult without immunohistochemical staining, nevertheless the correct diagnosis is made possible by a careful examination of cytological details. Imprint preparations of tumor masses may be particularly useful in identifying the myeloid nature of the cells. Auer rods may be found and the myeloblasts may show intense staining with myeloperoxidase cytochemical reaction. However, eosinophilic myelocytes are present in 50% of the cases. Electron microscopic finding of electron-dense granules characteristic of granulocytic cells is considered pathognomonic of GS.

Histopathologists should be aware of the fact that granulocytic sarcoma may occur in unusual extramedullary sites without evidence of bone marrow involvement. If inappropriate treatment is to be avoided, a diagnosis of granulocytic sarcoma should be considered when hematopoietic tumor cells do not stain with conventional antibodies against B- and T-lymphoid cells. Both histochemical and immunohistochemical staining should be performed in such cases to determine whether the cells are of myeloid lineage. A diagnosis of granulocytic sarcoma is not ruled out when bone marrow biopsy specimens show no evidence of leukemic infiltration.

REFERENCES