The Korean Journal of Internal Medicine
Vol. 10, No. 2, July, 1995

A Case of Granulocytic Sarcoma of the Brain in a Patient with Myelodysplastic Syndrome

Ho Soo Lee, M.D., Jin Woo Jeon, M.D., Joo Ho Kim, M.D., Tae Eung Park, M.D., Sung Kyu Park, M.D., Jong Ho Won, M.D., Seung Ho Baick, M.D., Dae Sik Hong, M.D. and Hee Sook Park, M.D.

Department of Internal Medicine, Soonchunhyang University, Seoul, Korea

Granulocytic sarcoma is rare extramedullary tumor composed of myeloblasts and other granulocytic precusors. The majority of cases have been reported in association with acute myeloid leukemia (AML) or myeloproliferative disorders. Granulocytic sarcoma may occur in patients with myelodysplastic syndromes. Reports are very rare, especially in the brain.

We report an unusual case of granulocytic sarcoma of the parenchyma of the brain, occurring in a patient with myelodysplastic syndrome, diagnosed by cerebro-spinal fluid cytology and magnetic resonance imaging brain scan.

Key Words: *Granulocytic sarcoma, Brain, Myelodysplastic syndrome*

INTRODUCTION

Granulocytic sarcoma is a localized tumor composed of immature cells of the granulocytic series. The majority of cases have been reported in association with acute myeloid leukemia (AML), mostly in childhood and frequently noted only at autopsy[1]. Granulocytic sarcoma may be seen in three clincal situations. First, they may occur in association with known acute myelogenous leukemia (AML). Second, they may occur as an isolated finding in patients without a known diagnosis of leukemia and with normal bone marrow histology. Finally, granulocytic sarcomas may occur in patients with myelodysplastic syndromes or with myeloproliferative syndromes. Reports of granulocytic sarcoma, associated with the course of myelodysplastic syndromes, are few[2-5].

Such techniques as tissue imprints, electron microscopy and the performance of ASD-chloroacetate esterase(CAE) stains have been used to confirm the diagnosis of granulocytic sarcoma, and also immunohistologic stain has provided a potential tool by which granulocytic sarcoma may be recognized. Granulocytic sarcomas are most commonly found in bone, periosteum, soft tissues, lymph nodes and skin. Intracranial involvement of the central nervous system by granulocytic sarcoma is rare[6,7]. We report a case of granulocytic sarcoma of the brain in a patient with myelodysplastic syndrome with a brief review of the literature.

Address reprint requests to : Hee Sook Park, M. D., Department of Internal Medcine, Soonchunhyang University Hospital, 657 Hanam-dong, Yongsan-ku, Seoul, 140-743, Korea

CASE REPORT

A 55-year-old woman, who was diagnosed as myelodysplastic syndrome, complained of double vision on lateral gaze at 34th hospital day. There was no history of pulmonary tuberculosis, hypertension or diabetes mellitus. She never smoked or drank alcohol.

On admission, she showed a chronically ill-looking appearances. The vital signs were within normal range. On physical examination, she had slightly pale conjunctivae. Other physical examination did not show abnormal findings. Neurologic examination was negative.

Laboratory findings on admission showed that the white blood cell count was 28,000/mm^3 with 2 percent blasts and 12 percent monocytes, the hemoglobin was 9.4gm/dL, the hematocrit was 28.6% and the platelet count was 21,000/mm^3 (Fig. 1a). The cellularity of bone marrow was 90 percent with 17 percent blasts(Fig. 1b). A diagnosis of myelodysplastic syndrome and chronic

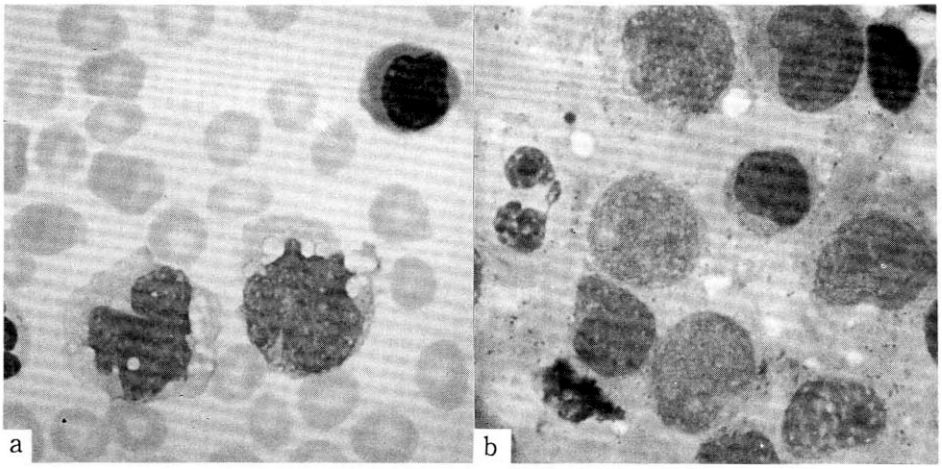

Fig. 1. a. Peripheral blood morphology with Wright-Giemsa stain shows moderate leukocytosis with increased monocytes.
b. Bone marrow smear shows increased myeloblasts(18%) and marked dysgranulopoietic features such as hypogranulation and pseudo-Pelger-Huet anomaly.

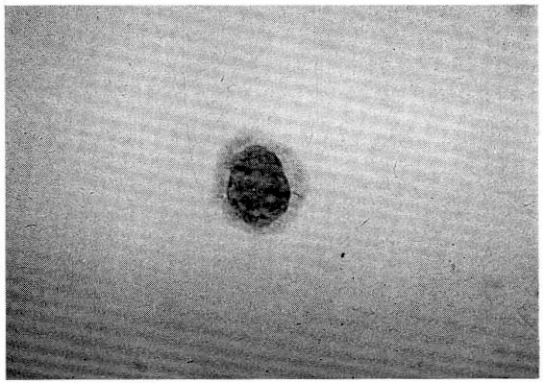

Fig. 2. Cerebro-spinal fluid cytology reveals a few monocytoid cells.

myelomonocytic leukemia (CMML) was established and treatment was initiated with low dose cytosine-arabinoside[8].

One month later, she complained of double vision on both lateral gazes, especially, severe on the right. Magnetic resonance imaging (MRI) brain scan revealed small nodular density in the midbrain(Fig. 3a). Cerebro-spinal fluid analysis was made. Cell morphologies were polymorphic and atypical monocytes and immature cells were seen(Fig. 2). The white blood cell count was 17,900/mm^3 with 3 percent blasts and 16 percent monocytes, the hemoglobin level 7.5gm/dL, and platelet count 4,000/mm^3. She was diagnosed as granulocytic sarcoma and treated with 2,520 cGy brain radiotherapy for 14 days. After radiotherapy, a follow-up magnetic resonance imaging brain scan revealed the disappearance of the lesion(Fig. 3b). Cerebro-spinal fluid cytology had returned to normal.

Five months later, she was rehospitalized with left side hemiplegia. Computed tomographic scan of the brain revealed 3×4cm sized, round, hyperdense masses with surrounding edema in the parenchyma of the brain(Fig. 3c). The white blood cell count at relapse was 86,100/mm^3 with 5 percent blasts and 9 percent monocytes, the hemoglobin was 9.1gm/dL and the platelet count was 12,000/mm^3. She was managed with conservative treatments, because of poor performance status, and died 6 month after diagnosis of granulocytic sarcoma.

DISCUSSION

Acute leukemias and myeloproliferative disorders have been found to be associated with tumors composed of granulocytic precursor cells. Such tumors, called granulocytic sarcoma or chloromas, are rare but can be found in every organ[1]. The term chloroma was first coined by King, because the lesions often display a greenish color, as a result of myeloperoxidase in the tumor cells. Granulocytic sarcomas are most commonly found in bone, periosteum, soft tissues, lymph nodes and skin, but they have also been reported in the gastrointestinal tract, tes-

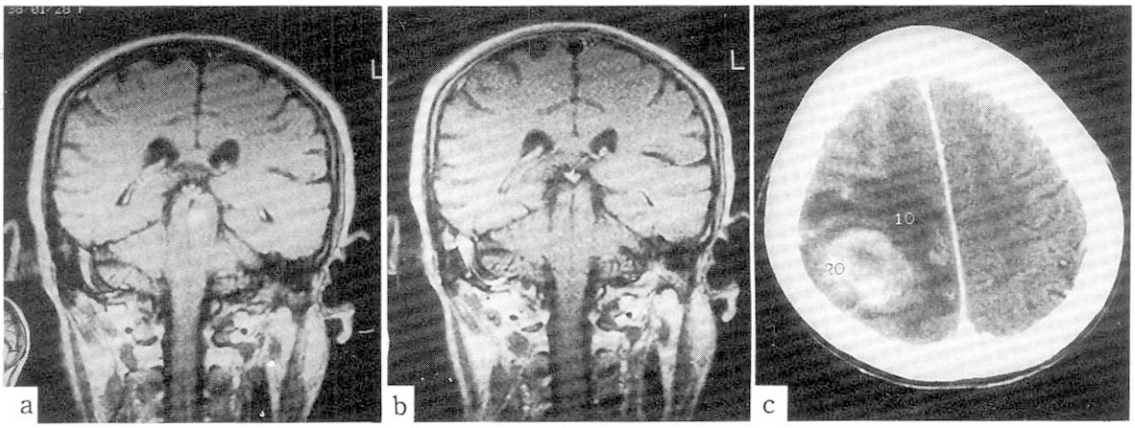

Fig. 3. a. MRI brain scan after occurrence of diplopia on lateral gaze shows nodular hyperintense lesion in posterior aspect of mid-brain on contrast enhanced T1-WI.
b. MRI brain scan after brain radiotherapy with 2520 cGY shows nearly complete resolution of previously noted nodular hyperintense lesion in mid-brain.
c. CT scan of brain after development of left-sided hemiplegia reveals relatively well defined, round inhomogeneous enhanced hyperdense mass lesion with surrounding edema in right parietal region.

tes, brain, salivary glands, vagina and pleura[1]. Diverse clinical presentations have been reported according to the involved sites.

Granulocytic sarcoma are usually composed of immature cells, with little myeloid differentiation evident on light microscopic exemination. The pathologic diagnosis of granulocytic sarcoma is difficult because of the immature nature of the cells. Granulocytic sarcoma are frequently misdiagnosed, especially when the diagnosis is not suspected clinically because of lack of a known diagnosis of leukemia. The presence of eosinophilic myelocytes in hematoxylin and eosin -stained paraffin-embedded tumor biopsy sections should suggest the diagnosis of granulocytic sarcoma.

The diagnosis of granulocytic sarcoma is established by histochemical staining of biopsy. Imprints with naphtol-ASD-chloro-acetate esterase (CAE) or by immunochemical staining with antilysozyme by an immunoperoxidase technique [1]. Both tests should be performed, because cases are frequently esterase-negative but lysozyme-positive. Granulocytic sarcomas may be seen in three clinical situations. First, they may occur in association with known acute myelogenous leukemia (AML). Second, they may occur as an isolated finding in patients without a known diagnosis of leukemia and with normal bone marrow histology at the time the granulocytic sarcoma is diagnosed. Finally, granulocytic sarcomas may occur in patients with myelodysplastic syndrome or with myeloproliferative syndromes. Many reports are presented about granulocytic sarcoma associated with leukemia[9-11], but reports of granulocytic sarcoma complicating the course of myelodysplastic syndromes are few[2-5]. In this report, granulocytic sarcoma developed in the parenchyma of the brain on the clinical course of chronic myelomonocytic leukemia, a subtype of myelodysplastic syndrome. The brain is a rare involved site of granulocytic sarcoma. On computed tomographic scans, isodense or hyperdense lesions can be appeared, edema and necrosis are variable and there is uniform enhancement following intravenous administration of contrast material[6]. In this case, on the last computed tomographic scan of the brain, the lesions appeared a hyperdense masses with surrounding edema. Although conclusive diagnosis of granulocytic sarcoma of the brain is biopsy, cerebro-spinal fluid cytology is very helpful. In cytology, diagnostic arguments in favor of granulocytic sarcoma are cellular polymorphism the presence of eosinophils, immature undifferentiated cells and atypical monocytes and, finally, the demonstration of myeloperoxidase in immature cells[12]. In this case, granulocytic sarcoma of the brain was suspected by MRI and cerebrospinal fluid cytology.

The management of granulocytic sarcomas depends on the clinical situation in which they

present. Treatment of granulocytic sarcomas in patients with concurrent acute myeloid leukemia depends on the size and location of the tumor and on its responsiveness to systemic therapy.

Granulocytic sarcoma are highly responsive to radiation therapy. Doses of 10 to 20 Gy generally result in rapid disappearance of tumor masses. In our case, also rapid remission occured. The prognosis of granulocytic sarcoma associated with myelodysplastic syndrome is poor. Development of granulocytic sarcoma is generally a harbinger of evolution to acute leukemia.

REFERENCES

1. Neiman RS. Barcos M, Berard C, Bonner H, Mann R, Rydell RE, Bennett JM. *Granulocytic sarcoma a clinicopathologic study of 61 biopsied cases. Cancer 1981; 48:1426.*
2. Da Silva MAP, Moriarty A, Schultz S, Tricot G. *Extramedullary disease in myelodysplastic syndromes. Am J Med 1988; 85:589.*
3. List AF, Gonzalez-Osete G, Kummet T, Doll DC. *Granulocytic sarcoma in myelodysplastic syndromes: Clinical marker of disease acceleration. Am J Med 1991; 90:274.*
4. Gittin RG. Scharfman WB, Burkart PT. *Granulocytic sarcoma: Three unusual patients. Am J Med 1989; 87:345.*
5. Sadic N, Edlin D, Myskowski PL, Gold E, Gee T, Safai B. *Granulocytic sarcoma: A new finding in the setting of pre-leukemia, Arch Dermatol 1984; 120:1341.*
6. Barnett MJ, Zussman WV. *Granulocytic sarcoma of the brain: A case report and review of the literature. Radiology 1986; 160:223.*
7. Krishnamurthy M, Nusbacher /N, Elguezabal A, Seligman BR. *Granulocytic sarcoma of the brain. Cancer 1977; 39:1542.*
8. Solal-Celigny P, Desaint B, Herrera A, Chastang C, Amar M, Vroclans M, Brousse N, Mancilla F, Renoux M, Bernard JF, Boivin P. *Chronic myelomonocytic leukemia according to FAB classification: Analysis of 35 cases. Blood 1984; 63: 634.*
9. Wiernick PH, Serpick AA. *Granulocytic sarcoma (Chloroma). Blood 1970; 35:361.*
10. Sears HF, Reid J. *Granulocytic sarcoma: Local presentation of a systemic disease. Cancer 1976; 37:1808.*
11. Won JH, Hong DS, Park HS, Kim IS, Lee DW, Kim WB. *Granulocytic Sarcoma of the Breast in non-leukemic patient. Korean J Hematol 1989; 24:535.*
12. Lagrange M, Gaspard MH, Lagrange JL, Michiels JF, Hofman P, Thyss A, Schneider M. *Granulocytic sarcoma with meningeal leukemia but no bone marrow involvement at presentation: A report of two cases with characteristic cerebrospinal fluid cytology. Acta Cytol 1992; 36:319.*