Gallium-67 Scintiscan in the Diagnosis of Primary Splenic Non-Hodgkin's Lymphoma After the Treatment of Hodgkin's Disease

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A rare primary non-Hodgkin's lymphoma (diffuse large cell) of the spleen developed in a 72-yr-old man who had successful radiotherapy to the right inguinal region for Hodgkin's disease 23 yr ago. Radiologic findings, particularly the ^{67}Ga scintigraphy finding, were very useful in leading to the correct diagnosis of malignant splenic lymphoma, in this case, preoperatively.

J Nucl Med 1992;33:1183–1185

In recent years, the survival of patients with Hodgkin's disease has improved significantly as a result of aggressive treatment with radiotherapy, chemotherapy or combined modalities. Unfortunately, second malignant tumors are now being observed with increasing frequency in these patients. The most common second malignant tumor is acute nonlymphocytic leukemia followed by solid cancers and non-Hodgkin's lymphoma (NHL). Although the risk of solid tumor does not vary significantly among various therapeutic modalities, the risk of leukemia is much higher following either adjuvant chemotherapy or chemotherapy alone (*1–3*).

A malignant tumor of NHL rarely originates within the spleen. In a series from the Memorial Sloan-Kettering Institute, only 2.6% of all types of NHL were due to primary splenic NHL (*4*). We describe a rare case of diffuse large-cell (histiocytic) non-Hodgkin's lymphoma of the spleen which developed 23 yr after external radiation therapy for Hodgkin's disease of mixed cellularity. Characteristic scintigraphic findings along with radiologic findings are illustrated.

Received Nov. 1, 1991; revision accepted Jan. 31, 1992

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CASE REPORT

A 72-yr-old man was admitted with intermittent sharp left upper quadrant (LUQ) pain for 5 wk and splenomegaly of unknown duration. He had a past history of Hodgkin's disease in the right inguinal region treated by external radiation therapy 23 yr ago. The patient was relatively well until five weeks prior to admission when splenomegaly and tenderness in the LUQ without fever or hemoptysis were noted. An abdominal ultrasound revealed a large mass with necrosis within the superior portion of the spleen and a small hyperechoic nodule in the left hepatic lobe suggesting a hemangioma (Fig. 1). Computed tomography of the abdomen also showed a large cystic splenic mass with irregular inner wall. The mass was sharply demarcated from the remaining normal spleen which was enlarged (Fig. 2). A ^{99m}Tc-red cell scan (both planar and SPECT) failed to reveal a small hepatic cavernous hemangioma of less than 2 cm in size in the left lobe but revealed splenomegaly with a large photon deficient area in the upper pole of the spleen (Fig. 3A). A ^{67}Ga scan was recommended for further evaluation of the splenic mass and the whole-body scan demonstrated a large area of intense uptake with irregular area of decreased uptake within the mass consistent with a necrotic process (Fig. 3B). There was no other area of abnormal uptake. The ^{67}Ga scan finding along with the patient's past history, physical and clinical findings were consistent with malignant splenic lymphoma rather than an abscess. CT-guided needle aspiration biopsy of the splenic mass failed to demonstrate malignancy but did demonstrate necrotic cells. Exploratory laparotomy with splenectomy revealed a large spleen (18 × 13 × 11 cm) and a large yellowish tumor (9 × 8 cm) with central necrosis. The mass adhered to the peritoneum and two small nodules were found at the left diaphragm. Histology revealed diffuse large-cell non-Hodgkin's lymphoma. Postoperatively, the patient is doing well and is presently being evaluated for chemotherapy.

DISCUSSION

Non-Hodgkin's lymphoma is an infrequent late complication following the treatment of Hodgkin's disease, although an increasing number of cases have been described recently (*1–3,5,6*). Natural evolution of Hodgkin's disease may include a shift in the histiologic classification

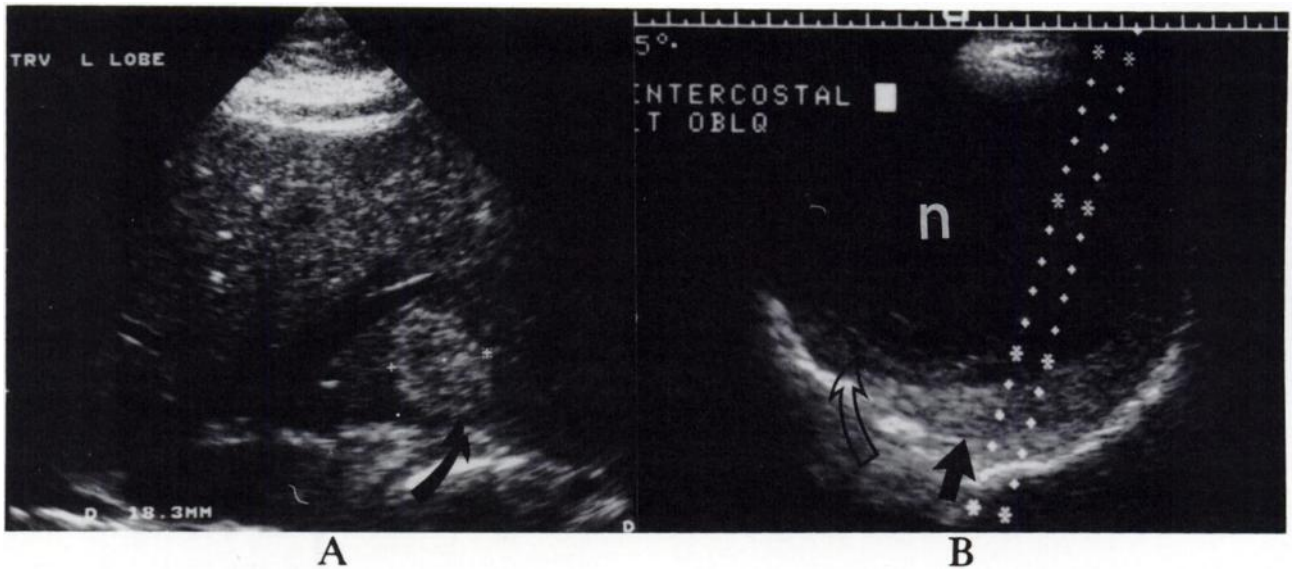

FIGURE 1. An abdominal ultrasonograph depicts a small hyperechoic nodule (1.8 cm) in the left lobe consistent with a benign hepatic hemangioma (curved black arrow) (A). There is a large splenic mass with central necrosis (n). Solid black arrow points to normal splenic tissue; open arrow indicates tumor (B).

from lymphocytic predominance to mixed cellularity or to lymphocyte depleted but the changes do not include a change to non-Hodgkin's lymphoma (*6*).

The pathogenesis of second malignant tumors such as non-Hodgkin's lymphoma is not clear but impaired cellular immunity, immunosuppression by intense treatment, direct cellular effects of radiation, and chemotherapy have been implicated (*1–3,5,6*). Non-Hodgkin's lymphoma occurring as a second malignancy has been linked to immunologic defects that may allow a clonal proliferation of B cells (*3*). Immunologic theory in this case is a possible explanation for the development of non-Hodgkin's lymphoma in the spleen since the spleen was out of the radiation portal and direct radiation effect is an unlikely explanation for second splenic non-Hodgkin's lymphoma.

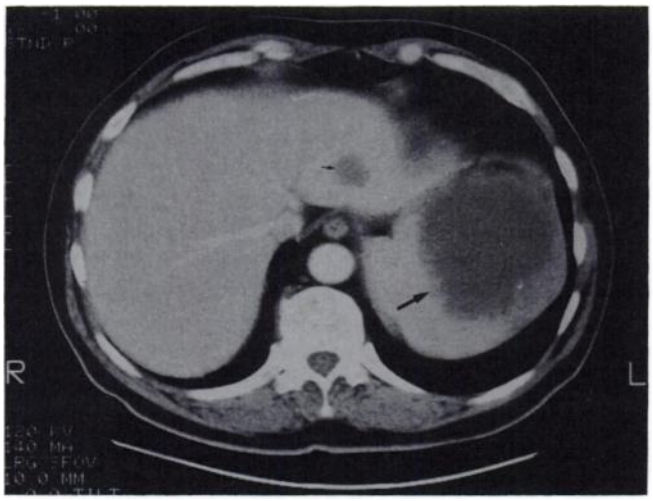

FIGURE 2. An abdominal computed tomograph shows a well-demarcated large cystic mass within the spleen with irregular wall (large arrow). A small, low-density nodule in the left hepatic lobe is also seen (small arrow).

Primary splenic non-Hodgkin's lymphoma is rare, although splenic involvement by the non-Hodgkin's lymphoma is not infrequent. Primary splenic non-Hodgkin's lymphoma is a subset of lymphoma in which the disease is thought to start within the spleen or the bulk of the disease is located in the spleen and then spreads to other sites (*4*).

The Gross pathologic findings of diffuse large-cell non-Hodgkin's lymphoma of the spleen are characterized by a single large mass or multiple confluent nodules with central necrosis (*7*). Radiologic imaging with CT and US depict the pathologic findings of primary splenic non-Hodgkin's lymphoma as well as splenomegaly (*8*).

Primary splenic non-Hodgkin's lymphoma has a clinically recognizable pattern. However, the preoperative diagnosis of the condition was not considered in over 50% of the cases in the literature (*7*). In managing our patient, ^{67}Ga scintigraphy played an important role in suggesting malignant lymphoma rather than other splenic lesions such as abscess, hematoma, and cyst (*9*). Splenic cyst and hematoma fail to concentrate ^{67}Ga. In fact, these lesions may depict a photon deficient area (*9*). Splenic abscess and lymphoma may have similar gallium scan findings, but the former usually demonstrates fairly uniform uptake within the abscess wall. An additional point against this is the general well being of our patient; usually an abscess of this size makes the patient very sick who then presents with septicemia and high fever (*10*). Therefore, radiologic and ^{67}Ga scan findings along with clinical and laboratory pictures (afebrile, no leukocytosis) of our case guided us to the diagnosis of lymphoma.

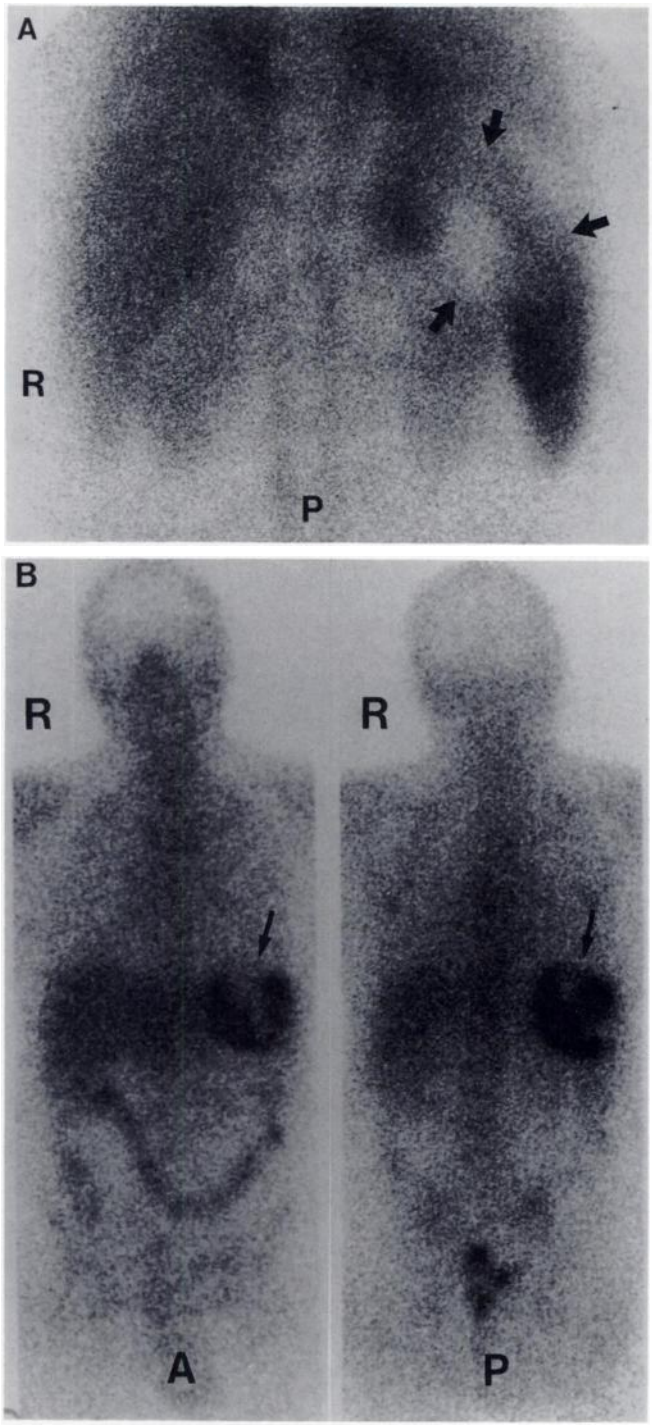

FIGURE 3. A ^{99m}Tc-RBC posterior liver-spleen scan demonstrates splenomegaly with a large defect in the upper pole of the spleen (arrows). (P: posterior view, R: right side) (B) Whole-body ^{67}Ga scan taken 72 hr postinjection reveals a large irregular area of intense increased uptake with irregular area of decreased uptake consistent with central necrotic process in the mass (arrows) and no other area of abnormal uptake. (A: anterior view, P: posterior view, R: right side)

REFERENCES

1. Tawil E, Mercier JP. Second malignancy complicating Hodgkin's disease. *J Can Assoc Radiol* 1983;34:108–113.
2. Boivin J, O'Brien K. Solid cancer risk after treatment of Hodgkin's disease. *Cancer* 1988;61:2541–2546.
3. Tucker MA, Coleman CN, Cox RS, Varghese A, Rosenberg SA. Risk of second cancers after treatment for Hodgkin's disease. *N Engl J Med* 1988;318:76–81.
4. Kehoe J, Straus DJ. Primary lymphoma of the spleen. *Cancer* 1988;62:1433–1438.
5. List AF, Greer JP, Cousar JB, et al. Non-Hodgkin's lymphoma after treatment of Hodgkin's disease: association with Epstein-Barr virus. *Ann Inter Med* 1986;105:668–673.
6. Kim HD, Bedetti CD, Boggs DR. The development of non-Hodgkin's lymphoma following therapy for Hodgkin's disease. *Cancer* 1980;46:2596–2602.
7. Harris NL, Aisenberg AC, Meyer JE, Ellman L, Elman A. Diffuse large-cell (histiocytic) lymphoma of the spleen. *Cancer* 1984;54:2460–2467.
8. Meyer JE, Harris NL, Elman A, Stomper PC. Large-cell lymphoma of the spleen: CT appearance. *Radiology* 1983;148:199–201
9. Rosenberg RJ, Sziklas JJ, Rich DA. Dual-radionuclide subtraction imaging of the spleen. *Semin Nucl Med* 1985;294–304.
10. Simson JNL. Solitary abscess of the spleen. *Br J Surg* 1980;67:106–110.