

Primary Adrenal Lymphoma: Gallium Scintigraphy and Correlative Imaging

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Primary adrenal lymphoma is a rare entity, with only 16 cases reported in the last 40 yr. Although ^{67}Ga scintigraphy has been extensively used to evaluate patients with other types of lymphomas, there are no reports of its use in patients with this disease entity. A man with primary adrenal lymphoma and no evidence of extraadrenal spread who was evaluated from presentation to remission with gallium scintigraphy and CT is presented. Gallium scintigraphy was valuable in assessing response to therapy.

Key Words: primary adrenal lymphoma; gallium scintigraphy; computed tomography; lymphoma

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CASE REPORT

A previously healthy 38-yr-old man with no history of drug abuse, TB exposure or HIV infection presented to his primary care physician with fever, night sweats and weight loss. Physical exam and chest radiograph both were negative and laboratory tests were normal, except for a mildly elevated white cell count of 12,000 cells, with a normal differential and platelet count. The diagnostic workup included a CT scan of the chest and abdomen that revealed a 10 cm \times 8 cm \times 7 cm heterogeneous low-density left suprarenal mass displacing the left kidney inferolaterally (Fig. 1). A normal left adrenal gland was not seen. The remainder of the CT was only remarkable for multiple cysts in the liver. Ultrasound demonstrated a solid mass with heterogeneous low-level echoes. Histological examination of the core needle biopsy revealed large B-cell, sclerosing type lymphoma, which is a subtype of the diffuse histiocytic category of intermediate-grade non-Hodgkin's lymphoma. A whole-body gallium scan was performed that demonstrated a large area of intense radiotracer accumulation in the left upper quadrant, which correlated with the CT findings (Fig. 2). No other abnormal accumulations were noted. Bone marrow biopsy revealed no lymphocytic involvement of the marrow. The diagnosis of primary adrenal lymphoma was made.

After aggressive chemotherapy, a follow-up CT and gallium scan, 3 mo after presentation, showed decrease in size and uptake of radiotracer in the region of the tumor and no evidence of extraadrenal involvement (Fig. 3). After consolidative radiation therapy, a CT scan at approximately 1 yr after presentation showed only a small region of hypodensity in the left adrenal gland, and a gallium scan showed no uptake. Follow-up at 6 mo intervals for 1 yr showed no change. The hypodense region on CT was presumed to represent an area of fibrosis and the patient was considered to be in remission.

DISCUSSION

Adrenal involvement in non-Hodgkin's lymphoma is usually accompanied by disease elsewhere, especially retroperitoneal adenopathy (1). One autopsy series reported up to 25% adrenal involvement with lymphoma (2,3). Unlike secondary lympho-



FIGURE 1. Contrast-enhanced CT of the abdomen shows a large heterogeneous low-density left suprarenal mass (arrows). There is a mild homogeneous enhancement at the periphery of the mass while the center remains relatively hypodense. No calcification is seen. Incidental hepatic cysts are noted.

matous involvement of the adrenal glands, primary adrenal lymphoma is a relatively rare entity. There have been 16 cases reported in the last 40 yr (4-17). Of the cases reported, CT and ultrasound were the imaging modalities used to describe the lesions. A computerized search of literature, back to 1966, shows no previous description of primary adrenal lymphoma using gallium scintigraphy.

Gallium-67-citrate, known for its avidity for lymphoma cells, is often used in detecting, staging and evaluating the treatment response of lymphomas. The hypothesized mechanism of localization is that of binding with lactoferrin and ferritin in actively growing tumor tissue, as well as inflamed tissue. Because ^{67}Ga

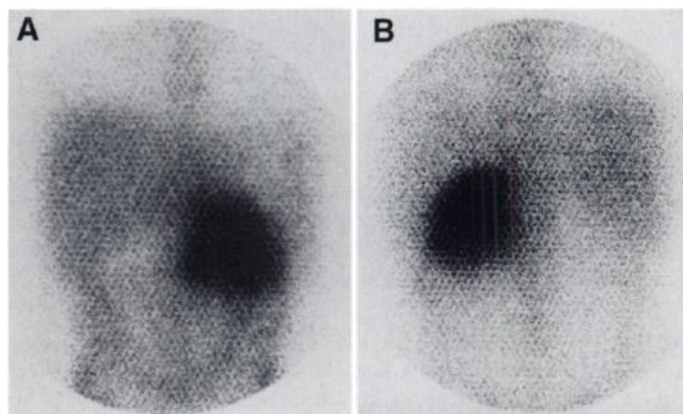


FIGURE 2. Gallium images. (A) Anterior and (B) posterior images of the abdomen from a whole-body gallium scan show a large left upper quadrant focus of intense increased radiotracer uptake corresponding to the CT finding.

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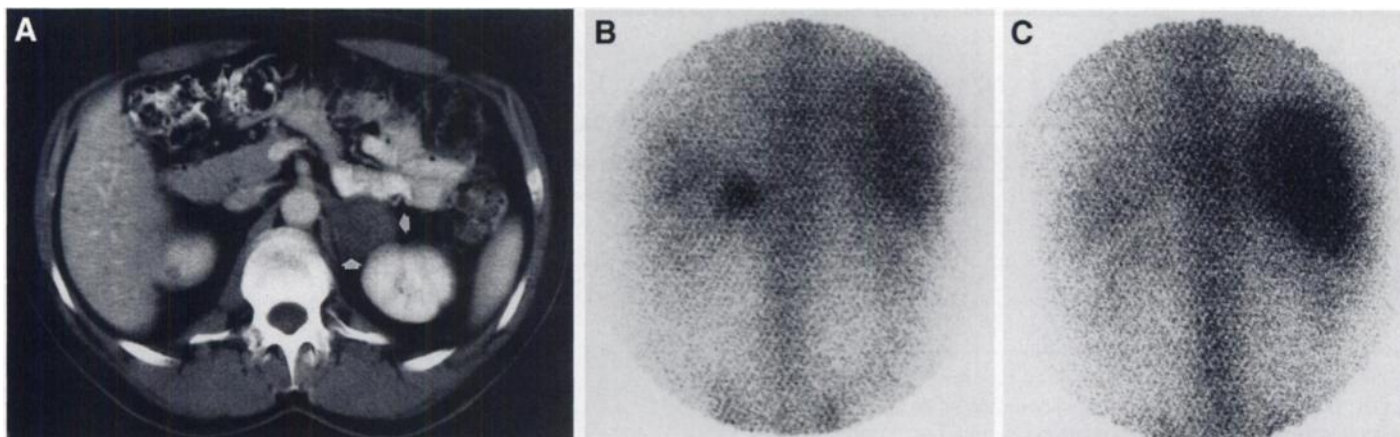


FIGURE 3. Post-treatment imaging. (A) CT shows significant decrease in the size of the left suprarenal mass (arrows). (B) Gallium scintigraphy shows significant reduction in radiotracer uptake in the left upper quadrant consistent with response to therapy. (C) Gallium scintigraphy 1 yr after treatment showing no abnormal radiotracer uptake in the left upper quadrant consistent with remission. Note normal physiologic renal activity bilaterally.

is not taken up by necrotic tumor and fibrosis, it is ideal in evaluating the residual post-therapy mass by virtue of being an indicator of tumor viability (18,19). Gallium-67 imaging is best interpreted in conjunction with pretherapy scans and with recent CT scans.

Gallium-67 has documented sensitivity of 78% and specificity of 97% for detecting lymphomas by planar imaging; tumors less than 2 cm are not reliably detected on planar scans (20). With an increase in dose to 10 mCi, SPECT imaging can improve contrast resolution and anatomical localization and thus increase sensitivity and specificity to 85% and 98%, respectively. After treatment, SPECT scintigraphy demonstrated an impressive sensitivity of 92% and specificity of 99% (20). However, these statistics were based on studies of intermediate and high-grade lymphoma groups. A recent study using the planar technique showed that the sensitivity of ^{67}Ga for low-grade lymphoma was relatively poor (56%) when compared to ^{201}Tl (100%) (21). The sensitivity and specificity for detection of Hodgkin's disease is slightly higher than that for non-Hodgkin's lymphoma (80% and 96%, respectively, for Hodgkin's disease versus 59% and 98% for non-Hodgkin's lymphoma) (22).

False-positive findings in gallium scan interpretation include postoperative surgical wound (1–2 wk postsurgery, including bone marrow biopsy sites), concomitant infectious focus and reactive pulmonary lymph nodes. Also, recent lymphangiography has been shown to cause increased pulmonary uptake of radiotracer (23). Rare cases of adrenal adenocarcinoma, adenoma and congenital adrenal hyperplasia have been reported to demonstrate uptake of gallium (24–26).

CONCLUSION

Although primary adrenal lymphoma is a relatively rare entity when compared to the incidence of adenomas and adrenal metastasis from other primary malignancies, it should be included in the differential of a solitary adrenal mass. Gallium-67 scintigraphy is valuable in evaluating treatment response of this entity.

REFERENCES

- Vicks BS, Perusek M, Johnson J, Tio F. Primary adrenal lymphoma: CT and sonographic appearances. *J Clin Ultrasound* 1987;15:135–139.
- Rosenberg SA, Diamond HD, Jaslowitz B, et al. Lymphosarcoma: a review of 1269 cases. *Medicine* 1961;40:31–84.
- Lee YTN, Spratt JS. Malignant lymphoma: nodal and extra-nodal disease. New York: Grune and Stratton; 1974:269.
- Levatier X, Troussard X, Fournier L, et al. Lymphome primitif surrenalien. Un observation. *Press Medicale* 1994;23:372–379.
- Alvarez-Castells A, Pedraza S, Tallada N, Castella E, Gifre L, Torrents C. CT of primary bilateral adrenal lymphoma. *J Comput Assist Tomogr* 1993;17:408–409.
- Abe J, Kaneko H, Takagi A, Umez H. Primary adrenal lymphoma. Report of an autopsy case. *Acta Pathologica Japonica* 1988;38:929–939.
- Feldberg MA, Hendriks MJ, Klinkhamer AC. Massive bilateral non-Hodgkin lymphoma of the adrenals. *Urol Radiol* 1986;8:85–88.
- Shea TC, Spark R, Kane B, Lange RF. Non-Hodgkin lymphoma limited to the adrenal gland with adrenal insufficiency. *Am J Med* 1985;78:711–714.
- Harris GJ, Tio FO, Van Hoff D. Primary adrenal lymphoma: a case report. *Cancer* 1989;63:799–803.
- Falchhook FS, Jeffrey CA. CT of primary adrenal lymphoma: a case report. *J Comput Assist Tomogr* 1991;15:1048–1050.
- Cunningham JJ. Ultrasonic findings in "Primary" lymphoma of the adrenal area. *J Ultrasound Med* 1983;2:467–469.
- Mizusawa H, Okaneya T, Yoneyama T, Taguchi I. Primary malignant lymphoma of the adrenal gland: a case report. *Hinyokika Kiyo* 1995;41: 991–994.
- Choi CH, Durishin M, Garbadawala ST, Richard J. Non-Hodgkin's lymphoma of the adrenal gland. *Arch Pathol Lab Med* 1990;114:883–885.
- Khan S, Raby N, Michell M. Non-Hodgkin's lymphoma confined to the adrenal glands presenting with Addison's disease. *Clin Radiol* 1990;42:63–64.
- Pagliuca A, Gillett DS, Salisbury JR, Basu RN, Mufti GJ. Bilateral adrenal lymphoma presenting as Addison's disease. *Postgrad Med J* 1989;65:684–686.
- Glazer HS, Lee JKT, Balfe DM, Mauro MA, Griffith R, Sagel S. Non-Hodgkin lymphoma. Computed tomographic demonstration of unusual extranodal involvement. *Radiology* 1993;149:211–217.
- Arai N, Akihiro H, Masanori U, Shirai T. Massive bilateral non-Hodgkin's lymphoma of the adrenal glands. *Jpn J Clin Hematol* 1990;31:1576–1580.
- Kaplan WD, Jochelson MS, Herman TS, et al. Gallium-67 imaging: a predictor of residual tumor viability and clinical outcome in patients with diffuse large cell lymphoma. *J Clin Oncol* 1990;8:1966–1970.
- Front D, Israel O. The role of Ga-67 scintigraphy in evaluating the results of therapy of lymphoma patients. *Semin Nucl Med* 1995;25:60–71.
- Front D, Israel O, Epelbaum R, et al. Ga-67 SPECT before and after treatment of lymphoma. *Radiology* 1990;175:515–519.
- Waxman AD, Eller D, Ashook G, et al. Comparison of gallium-67-citrate and thallium-201 scintigraphy in peripheral and intrathoracic lymphoma. *J Nucl Med* 1996;37:46–50.
- Larcos G, Farlow DC, Antico VF, Gruenewald SM, Boyages J. The role of high dose 67-gallium scintigraphy in staging untreated patients with lymphoma. *Aust N Z J Med* 1994;24:5–8.
- Lentle BC, Castor WR, Khaliq A, Dierich H. The effect of contrast lymphangiography on localization of 67-Ga-citrate. *J Nucl Med* 1975;16:374–376.
- Lorberboym M, Sarkar SD, Speiser P, Tannen G, New MI. Bilateral adrenal uptake of gallium-67 citrate in a patient with congenital adrenal hyperplasia. *Clin Nucl Med* 1990;15:849.
- Jackson JA, Naul LG, Montgomery JL, Carpentier WR, Roberts JW. Gallium-67 uptake by a benign adrenocortical adenoma. *J Nucl Med* 1988;29:1451–1453.
- Howman-Giles R, Dalla Pozza L, Uren P. Ga-67 scintigraphy in a child with adrenocortical carcinoma. *Clin Nucl Med* 1993;18:642–645.