Gallium-67-Citrate Scintigraphy of High-Grade T-Cell Non-Hodgkin's Lymphoma

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Scintigraphy with ^{67}Ga-citrate indicated the transition of an orbital pseudotumor into a lymphoma by a distinct increase in ^{67}Ga avidity. The patient initially presented with a pseudotumor in the right orbit that was verified by CT and MRI. It was caused by a chronic reactive lymphocytic inflammation extending from the lacrimal gland. At that time, scintigraphy was negative. Six and a half weeks later, the tumor had not responded to therapy and scintigraphy then showed a striking increase in gallium avidity. Consequently, the tumor was excised and histology ultimately revealed a high-grade non-Hodgkin's T-cell lymphoma.

Key Words: gallium-67-citrate; scintigraphy; orbital pseudotumor; non-Hodgkin's lymphoma

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Lymphomas arising from mucosa-associated lymphoid tissue (MALT) constitute a distinct clinicopathologic entity and include lymphomas of the gastrointestinal and respiratory tracts, thymus, thyroid and orbit. Since native lymphoid tissue is normally absent from those sites where MALT lymphomas occur, lymphoid tissue must be acquired there before a lymphoma can arise (*1*). Conventional radiology, including x-ray, CT or MRI, is a useful tool in demonstrating space-consuming masses, but it does not differentiate between chronic inflammatory ("pseudotumor") and malignant lesions and therefore necessitates additional biopsies for their identification. Gallium-67-citrate is recommended for differentiating between viable lymphoma tissue and fibrous or necrotic scar tissue after therapy (*2,3*). We report on the transition of a pseudotumor into a high-grade non-Hodgkin's lymphoma (NHL) that was correctly demonstrated by gallium scintigraphy.

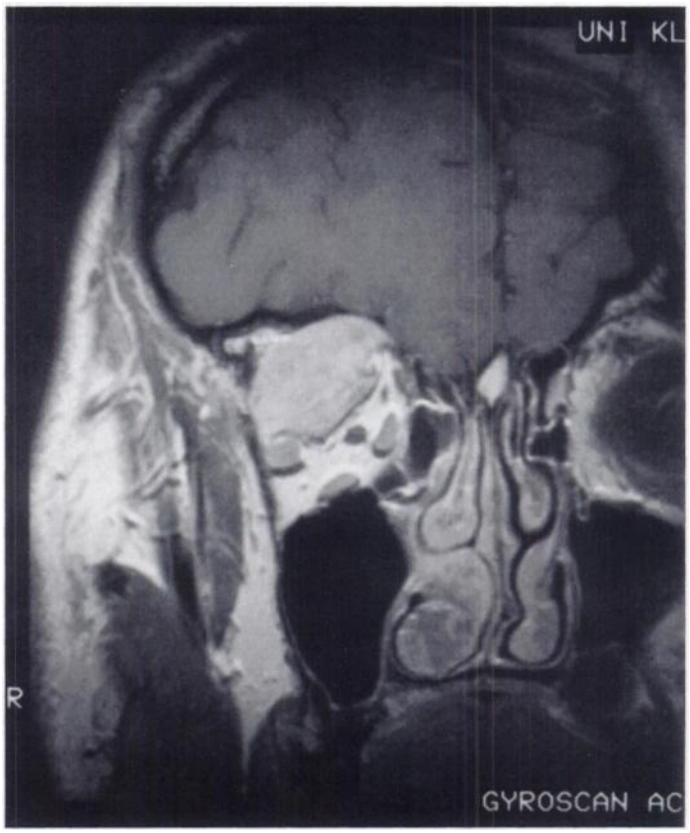

FIGURE 1. Coronal MRI of head contrasted with gadolinium. Note the expansion in the lateral cranial part of the right orbit measuring 5–2.5 cm in size.

CASE REPORT

A 38-yr-old man presented with impaired vision, reduced ocular motility and proptosis of the right eye. CT and MRI showed a distinctly outlined ovoid- to spindle-shape homogeneous mass arising from the lacrimal gland and encompassing the anterolateral portion of the orbital cavity (Fig. 1). Histologic examination and immunohistochemistry of a biopsy revealed a pseudotumor due to a chronic reactive lymphocytic inflammation of the lacrimal gland without any evidence of a malignant lymphoma. Since angiotensin-converting enzyme serum levels were elevated to 69 (normal range 18–55 U), sarcoidosis was considered and the patient was further evaluated by bronchoscopy and scintigraphy. However, planar scintigraphy after injection of 185 MBq (5 mCi) ^{67}Ga-citrate as well as bronchoscopy gave no indication of sarcoidosis. There was only a slightly increased uptake after 48 hr within the right orbit confirming the biopsy (Fig. 2). Subsequent steroid therapy with prednisone improved the motility of the right eye but left the proptosis unchanged. Forty-six days later, ^{67}Ga scintigraphy was repeated because the patient's symptoms deteriorated and MRI indicated tumor growth (Fig. 3). At that time, whole-body scintigrams and SPECT images after 48 hr clearly outlined the right orbit due to a quintuple uptake of ^{67}Ga as compared to the left lacrimal gland (Fig. 4). No further lesions were accumulating the radiopharmaceutical. Consequently, the tumor was excised and histological examination and immunohistochemistry revealed a high-grade non-Hodgkin's lymphoma of T-cell type. The patient underwent chemo- and radiotherapy and achieved a complete remission.

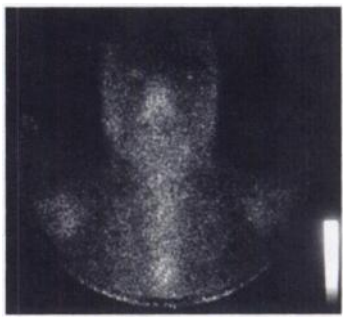

FIGURE 2. Planar scintigraphy 48 hr after injection of ^{67}Ga-citrate. Compared to the left orbit, the right orbit shows an only slightly increased uptake.

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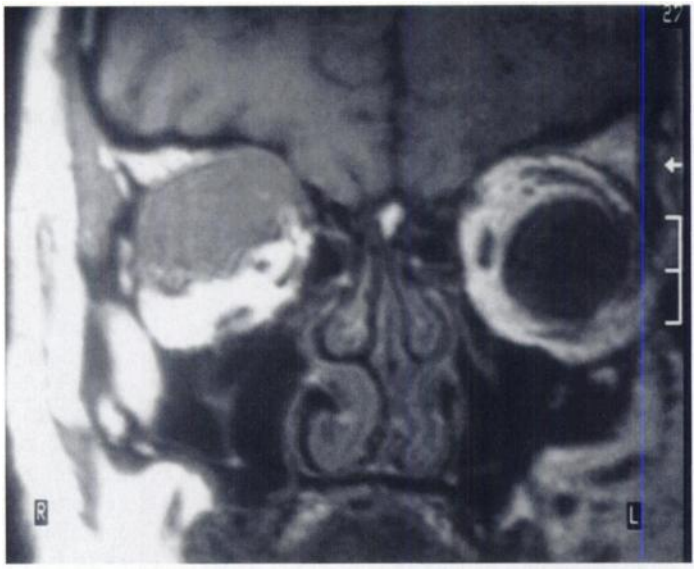

FIGURE 3. MRI follow-up examination 6.5 wk later. Compare with Figure 1 and note the increase in size of the space-consuming mass.

DISCUSSION

Gallium-67-citrate is well known for its uptake by viable lymphomatous tissue but not by fibrotic or necrotic scar tissue (*2,3*). Therefore, ^{67}Ga scintigraphy is recommended as a valuable tool for follow-up examinations (*4*), provided that the gallium avidity of the lymphoma has been established prior to therapy and SPECT recordings by a double-head camera are judiciously interpreted. In this respect, it may be superior to CT and probably even to MRI in defining the remission status of lymphoma patients (*4–8*). The sensitivity and the specificity for the detection of malignant lymphomas is reported to be 85% and 98% prior to therapy and 92% and 99% after therapy (*4*).

Our patient's orbital pseudotumor, which represented a chronic reac ive lymphocytic inflammation as shown by morphologic and immunohistochemical studies, was practically gallium-negative. However, 6.5 wk later, the second scintigraphic investigation showed an orbital lesion with an exceedingly high avidity for ^{67}Ga-citrate that was now five times increased. In comparison, somatostatin receptor scintigraphy of malignant lymphomas demonstrated a mean uptake after 48 hr that was only twice as high than the background uptake (*9*). However, the differentiation between orbital pseudotumors and orbital malignant lymphomas by gallium scintigraphy may be ambiguous as one study of seven orbital pseudotumors reported three as negative and four as positive (*10*). Nevertheless, the acquisition of a high avidity for gallium reflected the transition of a pseudotumor into a non-Hodgkin's T-cell lymphoma of high malignancy and could therefore be regarded as a strong indicator for the development of a malignant lesion.

FIGURE 4. Planar follow-up scintigraphy with ^{67}Ga-citrate 6.5 wk later. Compare with Figure 2 and note the distinctly increased uptake by the right orbit.

Orbital T-cell, non-Hodgkin's lymphomas are exceedingly rare in the Western world. A retrospective morphologic and immunophenotypic study of 99 cases of orbital and conjunctival lymphoid infiltrates detected only B-cell lymphomas (*11*). However, Hirasaka et al. (*12*) have reported one case of primary orbital T-cell non-Hodgkin's lymphoma in Japan. Since ^{67}Ga-citrate scintigraphy studies of orbital lymphomas have not been reported as yet, it is impossible to state whether the acquisition of a high avidity for gallium is specific for certain subtypes of orbital NHL.

CONCLUSION

The reported case demonstrated a striking increase in gallium avidity of an orbital lesion caused by the transition of a chronic inflammatory lesion into a high-grade NHL. It should therefore encourage further studies to establish the value of gallium scintigraphy as a noninvasive tool for the detection of early tumor development.

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