Gallium-67 Imaging in Muscular Sarcoidosis

G. Edan, P. Bourguet, Ph. Delaval, and J. Y. Herry

Hôpital de Pontchaillou, and G.B.M. Facuté de Médecine Rennes, France

A case is presented of sarcoid myopathy in which radiogallium was seen to accumulate in the sites of muscle involvement. Uptake of the radiotracer disappeared following institution of corticosteroid therapy. The exceptional nature of this case contrasts with the high frequency of biopsy evidence of sarcoid muscle disease but is consistent with the rarity of clinical evidence of sarcoid granulomas in muscle. Gallium-67 imaging can be used to determine the extent of muscle involvement and, through evaluation of uptake intensity, the degree of disease activity before and after treatment.

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The usefulness of gallium-67 citrate imaging for the diagnosis, delineation of sites of involvement, and follow-up of sarcoid lesions has been amply documented (1–4). Imaging of lesions in mediastinal lymph nodes, lungs, salivary and lacrimal glands, and spleen has been shown clearly by this technique. The present report describes an instance of muscle uptake of radiogallium in a patient with muscular involvement by sarcoidosis. Resolution of the clinical picture followed institution of corticosteroid therapy and was reflected in a return to normal scintigrams.

The method involved the intravenous injection of gallium-67 citrate in a dose of 60 μCi/kg body weight, with imaging by scintillation camera 72 hr after injection. Uptake of tracer in the various diseased sites was graded according to the scheme proposed by several investigators (*1*,*5*), whereby grade 0 is equivalent to shoulder soft-tissue activity, grade 1 being greater than background but less than hepatic activity, grade 2 equal to hepatic uptake, and grade 3 greater than hepatic uptake.

CASE REPORT

A 31-yr-old man was admitted to hospital in May 1981 with muscle complaints consistent with sarcoidosis, which was diagnosed 5 yr previously on the following criteria: bilateral mediastinal adenopathy, transbronchial lung biopsy evidence of non-necrotic epithelioid and giant-cell granulomas within pulmonary parenchyma, and elevated serum angiotensin-converting enzyme activity (78 IU/ml compared with a normal range of 21.8 ± 5.6 IU/ml). At that time no treatment was prescribed. Onset of bilateral anterior and posterior uveitis 2 yr later prompted a 3-mo course of corticosteroid treatment (30 mg of prednisone on alternate days). One year later, lacrimal involvement resulted in keratoconjunctivitis sicca.

An initial radiogallium study, performed in 1980, showed abnormal activity over the parotid glands (grade 2), eyes (grade 1), lung parenchyma (grade 1), and spleen (grade 2).

The course of the myopathy was marked by two acute episodes: the first, in March 1981, was of mild-to-moderate severity, lasted 3 mo, and resolved after two intramuscular injections of 40 mg methylprednisolone; the second, in August 1981, was sufficiently severe to warrant hospitalization. Muscle involvement remained subacute, with weakness resembling myasthenia gravis, muscle pain and tenderness, muscular hypertrophy, and edema of the extremities. The lower limbs were primarily affected, making walking difficult, but the upper limbs were also involved. Superficial reflexes were abolished, deep tendon reflexes diminished. Retraction of the tendons limited dorsiflexion of the foot and extension of the wrist. Besides muscle involvement, disease manifestations included large skin nodules on the right knee and chest, enlarged axillary and inguinal lymph nodes, and conjunctivitis in the right eye.

Electromyography confirmed the muscular involvement. Plasma concentrations of muscular enzymes were increased. Biopsy of a *Tibialis anticus* muscle revealed marked sarcoid infiltration with virtual disappearance of muscle fibers. The radiogallium images (Fig. 1) performed during the second acute myopathic episode (August 1981) showed avid uptake (grade 2) in the muscles of the thighs, calves, and arms, and abnormal activity over the parotid glands (grade 2), lung parenchyma (grade 1), and spleen (grade 1). Serum angiotensin converting enzyme activity was 98 IU/ml.

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For reprints contact: Professeur J. Y. Herry, Laboratoire de Médecine Nucléaire, Centre Eugène Marquis—Hôpital de Pontchaillou; 35011 Rennes, France.

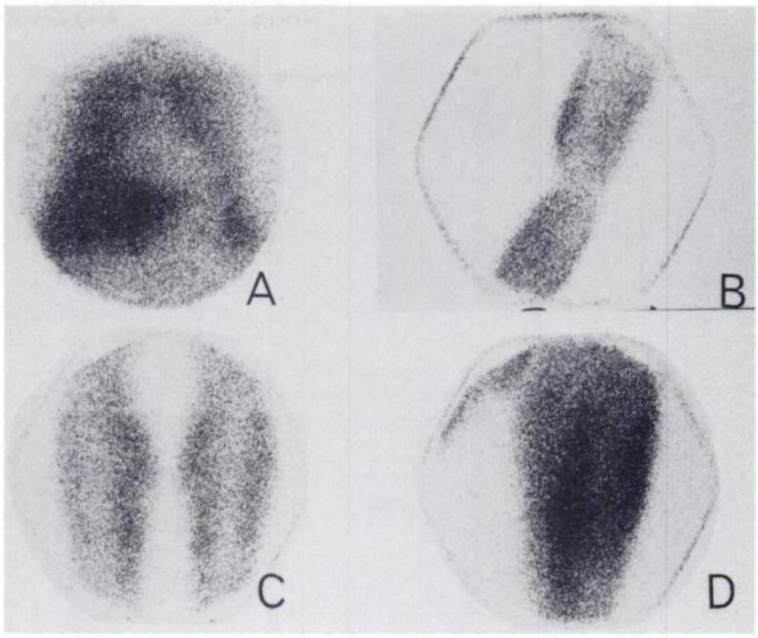

FIG. 1. Ga-67 images made during acute myopathic episode, showing diffuse uptake in both lungs and spleen (A), and uptake in arm muscles (B), calves, and thigh.

Prednisone treatment was begun at a dose of 40 mg a day for 4 mo and tapered to the current dose of 5 mg on alternate days. All disease manifestations resolved completely. A Ga-67 image performed in January 1982, with the patient still on prednisone, was normal (Fig. 2), as was serum angiotensin-converting enzyme activity.

DISCUSSION

Muscular involvement of sarcoidosis presents a variable picture and is very often asymptomatic. Routine muscle biopsy has revealed sarcoid granulomas in muscle in over 50% of cases (*6*). By contrast, clinically symptomatic lesions occur in less than 0.5% of cases. They fall into three groups (*7*): (a) muscle tumors or nodules, marked by the rapid growth of painless nodules of varying size, arising in muscle and unaccompagnied by limitation of movement or muscle weakness; (b) acute or subacute myositis developing over a period of 1 to several weeks in patients of both sexes, mainly under 40 yr of age, and producing a clinical picture of bilateral, symmetric muscle pain progressing to muscle contracture, hardening, and hypertrophy; and (c) chronic amyotrophic involvement occurring mainly in women between 50 and 60 yr of age, involving primarily the girdle muscles and progressing over many years to general incapacitation.

Corticosteroids are effective in patients with nodular lesions and acute myositis, but are ineffective in the chronic amyotrophic cases. The earlier treatment is begun, the more effective it is.

The case described here, which corresponds to a picture of acute or subacute myositis, is the first such case we have encountered in over 200 gallium imaging procedures performed in sarcoid patients. The rarity of this case contrasts with the high frequency of biopsy-proven sarcoid muscle lesions reported by Wallace (*9*), but is consistent with the rarity of clinically manifest muscle involve-

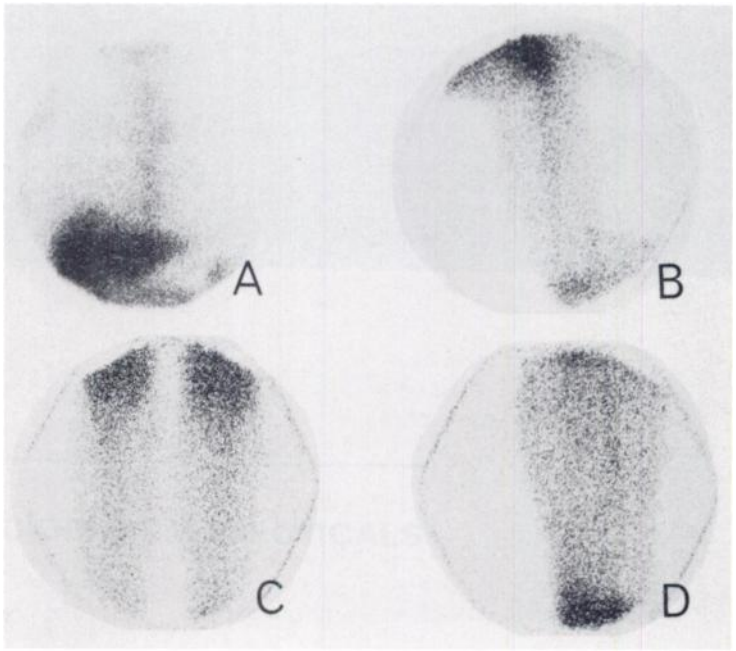

FIG. 2. Disappearance of gallium uptake after 4 mo of corticosteroid therapy. Normalized images of lungs and mediastinum (A), arm (B), calves, and thigh.

ment of sarcoidosis. This suggests that a "granuloma load" threshold must be reached before clinical signs of muscle involvement are apparent and before radiotracer accumulation is seen. Gallium-67 muscle uptake is not specific to sarcoidosis: evidence of muscular uptake has been reported to other inflamatory processes of muscle (*8,9*) and in a case of skeletal-muscle involvement of *Mycosis fungoides* (*10*). Nevertheless, in patients with seemingly isolated muscle lesions, radiogallium scintigrams of possible sarcoid lesions in other nonmuscular sites can clearly be of diagnostic usefulness.

In our experience gallium-67 imaging has proved helpful in determining the extent of muscle involvement and the other sites of active disease. As has been reported for other foci of sarcoid involvement, the degree of muscle uptake in our experience reasonably reflects the extent of the granulomatous process. Repeat imaging during treatment has been useful to monitor restoration of normal muscle and lung uptake and thus the effectiveness of treatment.

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