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Case Report

In-111 octreotide SPECT/CT in the early diagnosis of pulmonary sarcoidosis: A case report ☆,☆☆

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ABSTRACT

Sarcoidosis is a granulomatous disease of unknown etiology. At present the best diagnostic imaging procedure to assess stage and activity of sarcoidosis is controversial. We report the case of a 50-year-old male admitted with a history of dyspnea and fatigue with past medical history negative for smoking, occupational and environmental risk factors. Physical examination, routine blood tests, and pulmonary function tests were normal except for hypercalciuria. A chest radiograph showed bilateral hilar lymphadenopathy. Single photon emission computed tomography and/or computed tomography (SPECT and/or CT) In-111 Octreotide (Octreoscan) scintigraphy confirmed morphologic involvement of bilateral hilar lymph nodes and a mediastinoscopy biopsy specimen provided diagnosis of pulmonary sarcoidosis (stage 0). This clinical case shows the effectiveness of In-111 Octreotide SPECT and/or CT in the early diagnosis of pulmonary sarcoidosis.

Introduction

Sarcoidosis is a granulomatous disease of unknown etiology. The pathogenesis of sarcoidosis involves the interaction of an exogenous antigen with HLA class II molecules and T-cell receptors. The diagnosis is established when clinical and radiographic findings are confirmed by histology and other causes of granulomatous disease have been excluded [1,2]. The best way to assess the stage and activity of sarcoidosis remains the assessment of disease clinical activity whereas the usefulness of chest radiographic staging is presently controversial. Among procedures proposed to assess pulmonary disease, single photon emission computed tomography and/or computed tomography (SPECT and/or CT) In-111 Octreotide (Octreoscan) scintigraphy is included [3,4]. However, in the current literature there is limited information regarding the usefulness of SPECT and/or CT Octreoscan scintigraphy in qualitative and quantitative assessment of chronic inflammatory disease including sarcoidosis. We report a clinical case show-

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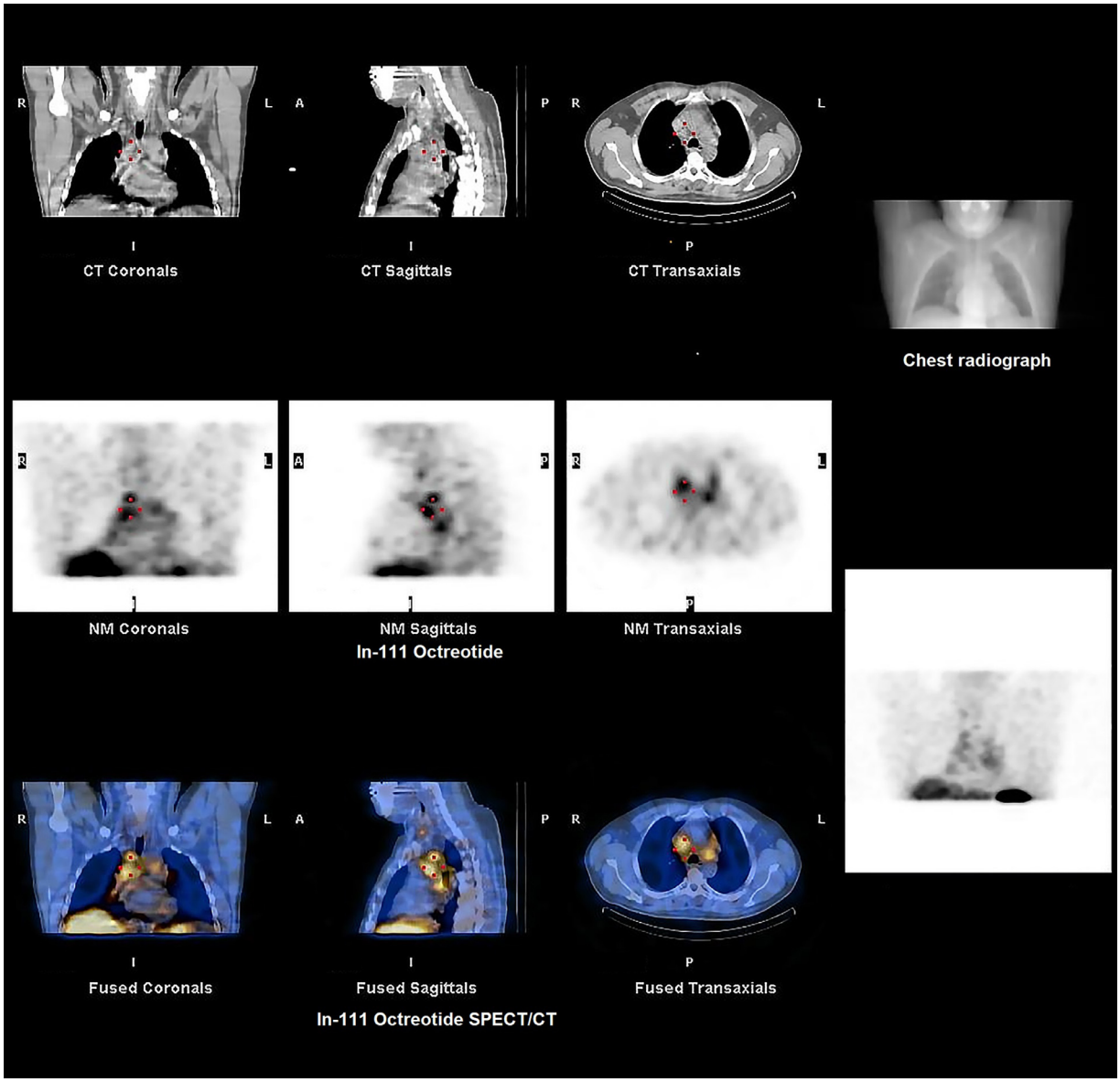

Fig. 1 – SPECT and/or CT Octreoscan scintigraphy showed morphologic involvement of bilateral hilar lymph nodes which also had an increased uptake (14.3 U.I.), compared to the rest of the lung (7.8 U.I., normal value ≤10 U.I.). Chest radiograph showing initial hilar adenopathy confirmed by CT, In-111 Octreotide and SPECT and/or CT.

ing the effectiveness of SPECT and/or CT Octreoscan scintigraphy in the early diagnosis of sarcoidosis (stage 0).

Case report

A 50-year-old Caucasian male was admitted with a month history of dyspnea Moser score I and fatigue. His past medical history was negative for smoking and occupational and/or environmental risk factors. The physical examination, routine blood tests, and pulmonary function tests were normal except for hypercalciuria. A chest radiograph showed a bilateral hilar lymphadenopathy (Fig. 1).

A SPECT and/or CT Octreoscan scintigraphy was performed according to the following protocol [3,4]. Somatostatin receptor scintigraphy (Octreoscan - Mallinckrodt Medical, Petten, The Netherlands) whole-body scans were obtained at 4 and 24-hours after the administration of 5 mCi of (^{111}In-DTPA- D-Phe1)-Octreotide. Thoracic images were obtained with SPECT at the same intervals after injecting the tracer. Whole body acquisition in 25 minutes included anterior and posterior views of head, thorax, abdomen, pelvis, and legs. Scintigraphic images were acquired with a double-head camera (Prism 2000, Picker). The camera had a medium-energy parallel-hole collimator using a 256 × 1024 or a 256 × 256 matrix. Acquisition was performed using both ^{111}In photo peaks (173 and 247 KeV) and a 20% window. The SPECT acquisition was performed with a double Indium photo-peak, 60 projections over 360° rota-

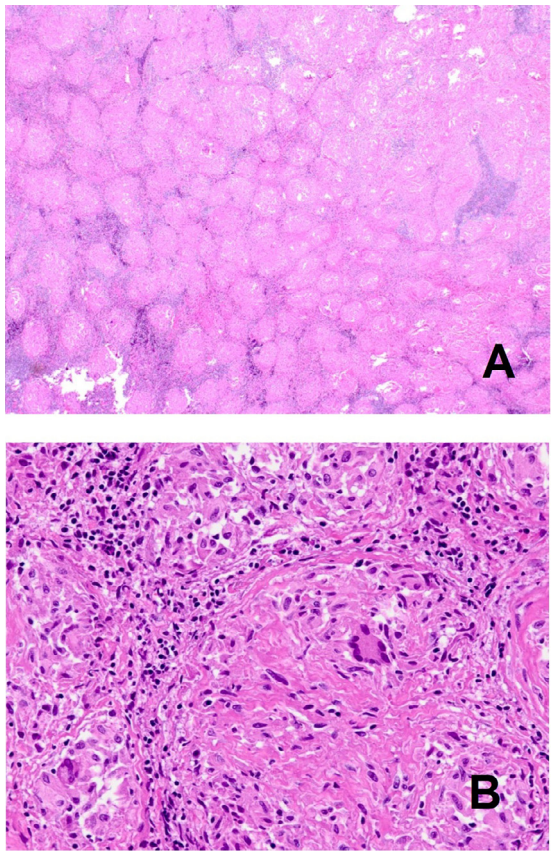

Fig. 2 – Photomicrograph of the biopsy sample stained with hematoxylin and eosin showed a confluent sarcoid granulomata pattern in thoracic lymph nodes at 20x (A) and 200x (B) magnification. Features showed multinuclear giant cells, mononuclear phagocytes, and lymphocytes. No necrosis was present.

tion and with a 64 × 64 matrix; slices were reconstructed after back projection, using a Butterworth (low pass) filter. The Octreoscan uptake index (U.I.) defined as the ratio between normalized accumulation of the tracer in the lungs and thigh, was evaluated in correlation with the diagnosis, and conventional imaging. Normal values of U.I. on 4-hours (best statistics) and 24-hours were obtained. According to these data, the normal value of U.I. at 24-hours was fixed at ≤10 U.I.

SPECT and/or CT Octreoscan scintigraphy showed morphologic involvement of bilateral hilar lymphnodes which also had an increased uptake (14.3 U.I.) (Fig. 1), compared to the rest of the lung (7.8 U.I., normal value ≤10 U.I.) (Fig. 1). Based on information supported by SPECT and/or CT Octreoscan, a mediastinoscopy biopsy specimen was obtained, and provided diagnosis of pulmonary sarcoidosis stage 0 (Fig. 2). Pulmonary arterial pressure was normal as shown by echocardiography.

The clinical symptoms and hypercalciuria disappeared after treatment with oral prednisone (0.5/Kg/lean body weight/day) in association with inhaled budesonide (400 mcg twice day for 3 months). Normalization of urinary calcium concentration, which is considered a specific disease biomarker [5], in association with disappearance of bilateral hilar lymphadenopathy on chest radiograph confirmed the remission of pulmonary sarcoidosis.

Discussion

Several routine procedures have been proposed to diagnose and assess disease activity in pulmonary sarcoidosis.

Chest high resolution computed tomography (HRCT) is particularly useful to detect pulmonary fibrosis. However, no significant correlation was found between the presence of pulmonary nodules detected by HRCT, and disease activity in the assessment of sarcoidosis [6].

Cardiac magnetic resonance imaging (MRI) provides the most accurate measurement of right ventricular mass and ejection fraction and plays a role in the diagnosis of pulmonary hypertension (PH) that may be detectable in sarcoidosis patients and is associated with increased mortality [7]. SPECT is useful to sequentially study pulmonary physiology in supine and upright positions to evaluate the redistribution of lung perfusion. Nevertheless, it requires comparison with conventional modalities such as Doppler echocardiogram, and right heart catheterization to confirm PH diagnosis.

Positron emission tomography (PET)-CT could be used to accurately assess disease activity in sarcoidosis patients, provides both a structural and functional lung assessment and is helpful in predicting pulmonary deterioration in untreated patients or pulmonary improvement expected after treatment [8,9]. The sensitivity of PET-CT for pulmonary sarcoidosis is greater than that of 67Gallium scintigraphy and shows positive results in cases with negative 67 Gallium scintigraphy particularly when lymph nodes and spleen are involved [10]. However, PET scans are expensive, and positive results may be observed in case of malignancy or of an alternative inflammatory condition. Moreover, the role of PET in long-term treatment following initial stabilization of irreversible disease requires exploration in large clinical trials [9].

SPECT and/or CT scintigraphy employing 18F-fluorodeoxyglucose (FDG) or somostatin receptor (Octreoscan) as tracer are useful to demonstrate active inflammation and to simultaneously provide SPECT and CT images [8,11]. This procedure enables to perform whole-body imaging quickly and with high anatomic resolution in several body areas, including the chest. In the current literature there is limited information regarding the usefulness of SPECT and/or CT Octreoscan scintigraphy in qualitative and quantitative assessment of disease activity in pulmonary sarcoidosis.

The clinical case of stage 0 sarcoidosis here reported highlights the sensitivity of SPECT and/or CT Octreoscan scintigraphy bio-morphologic data and U.I. in the early diagnosis of pulmonary sarcoidosis. Notably, in this case of stage 0 sarcoidosis, the areas of morphologic abnormalities also showed an increased quantitative SPECT and/or CT uptake. This is of relevant clinical interest because even though other scans such as the FDG and/or PET may facilitate the distinction between benign and malignant lesions, these results may be aspecific as they show increased uptake in inflammatory disease as well [8,11,12]. Moreover, current case found SPECT and/or CT Octreoscan scintigraphy useful for the identification of oc-

cult sites for biopsy, like the mediastinum, and for diagnosis when only 1 site is initially involved. Finally, SPECT and/or CT Octreoscan scintigraphy may have a role in identifying which patients have active inflammation and may respond to therapy including treatment with anti-inflammatory biologic drugs agents such as infliximab [9].

Therefore, we propose SPECT and/or CT Octreoscan scintigraphy as an accurate and cheaper tracer that may be of aid in diagnosis, staging, disease activity assessment, and surgical approach of pulmonary sarcoidosis.

Patient consent

We have de-identified all patient details in this case report and the requirement for ethical approval was waived by the Ethical Committee of Genoa Medical University because this is a case report.

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