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Clinicoradiological Sarcoidosis: A Case Study Of Extensive Mediastinal And Abdominal Nodal Calcifications With Pulmonary Nodularity

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Abstract

Aim: To present a rare case of sarcoidosis with extensive calcifications in mediastinal and abdominal lymph nodes, accompanied by perilymphatic pulmonary nodules, emphasizing the diagnostic value of radiological imaging in such atypical presentations. Introduction: Sarcoidosis is a multisystem granulomatous disorder of unknown cause, predominantly affecting the lungs and lymphatic system. While typical imaging findings can guide diagnosis, atypical radiological features require careful evaluation to differentiate from malignancy or other conditions. Materials and Methods: A 58-year-old female reported persistent cough and breathlessness. High-resolution computed tomography (HRCT) of the chest and contrast-enhanced CT (CECT) of the abdomen were performed. Imaging revealed multiple calcified lymph nodes across mediastinal and abdominal compartments. Pulmonary nodules were observed along peribronchovascular and subpleural regions, predominantly in a perilymphatic distribution. Additional findings included the nodular interface sign and axial interstitial thickening. Whole-body PET-CT and clinical investigations were undertaken to rule out malignancy. Results: Radiological evaluation showed extensive lymph node calcifications in the paraesophageal, pretracheal, paratracheal, subcarinal, and prevascular regions of the mediastinum, as well as abdominal nodes including celiac, peripancreatic, porta hepatis, precaval, and paraaortic areas. Lung imaging demonstrated peribronchovascular thickening, subpleural nodules, and nodular interfaces—hallmark features suggestive of sarcoidosis. PET-CT findings further supported a benign, inflammatory etiology. The diagnosis of sarcoidosis was established through clinicoradiological correlation. Conclusion: This case underscores the critical role of imaging in diagnosing atypical sarcoidosis. The presence of widespread nodal calcification and classic perilymphatic pulmonary nodules should prompt consideration of sarcoidosis, particularly when malignancy is excluded. Radiological assessment, combined with clinical evaluation, is vital for accurate diagnosis and appropriate management of unusual presentations of sarcoidosis.

Keywords: Sarcoidosis, Calcified Lymphadenopathy, Perilymphatic Nodules, Interface Sign, Mediastinal Nodes, HRCT Chest

INTRODUCTION

Sarcoidosis is a chronic, multisystem granulomatous disorder that most commonly affects the lungs and intrathoracic lymph nodes. Histologically, it is marked by the presence of non-caseating granulomas. Although numerous studies have explored its origins, the precise cause remains unknown. Potential etiological factors include autoimmune mechanisms, infectious agents, and environmental exposures. The disease is most often diagnosed in young to middle-aged adults and can involve various organ systems, leading to a broad spectrum of clinical presentations [1,2].

Pulmonary involvement is the most frequent form of sarcoidosis and often manifests as bilateral hilar lymphadenopathy, pulmonary infiltrates, and in some cases, extrapulmonary signs such as skin or eye lesions. Based on radiographic findings, pulmonary sarcoidosis is commonly staged from I to IV. Stage I includes only bilateral hilar lymphadenopathy, while Stage IV is characterized by pulmonary fibrosis. Although lymph node enlargement is a hallmark feature, nodal calcification is relatively rare. When present, it typically appears as fine, punctate, or eggshell-like calcifications and is usually associated with long-standing or healed disease [3,4].

The presence of extensive lymph node calcifications, particularly in both thoracic and abdominal regions, is uncommon in sarcoidosis and is more typically seen in conditions like healed granulomatous infections, such as tuberculosis or histoplasmosis, or in patients with previously treated lymphomas. Due to this overlap in imaging features, differentiating sarcoidosis from malignancy or infectious etiologies becomes a diagnostic challenge [5].

Accurate diagnosis relies on a combination of clinical assessment, radiologic imaging, and histopathological confirmation. Sarcoidosis can mimic other diseases, such as metastatic cancer or lymphangitic spread of tumors, especially when imaging shows extensive nodal involvement or interstitial lung changes [6].

This case report details the clinical and radiological findings in a 58-year-old woman who presented with

persistent respiratory symptoms. Imaging studies revealed widespread calcified lymphadenopathy in mediastinal and abdominal locations, along with peribronchovascular and subpleural nodules. These pulmonary findings were consistent with sarcoidosis. Additional investigations, including advanced imaging techniques and a thorough clinical evaluation, ruled out alternative diagnoses such as malignancy and infectious granulomatous disease. The final diagnosis of sarcoidosis was established based on a multidisciplinary approach [7].

This case serves as an example of an atypical presentation of sarcoidosis, emphasizing the importance of recognizing rare radiological patterns such as extensive lymph node calcification. It also underscores the value of integrating imaging findings with clinical and pathological data to arrive at an accurate diagnosis.

CASE DESCRIPTION

A 58-year-old woman presented with a history of persistent cough and mild breathlessness, with no associated systemic symptoms such as fever, weight loss, or hemoptysis. Her medical history was negative for tuberculosis or malignancy. On clinical examination, the only notable finding was the presence of mild end-inspiratory crackles on chest auscultation.

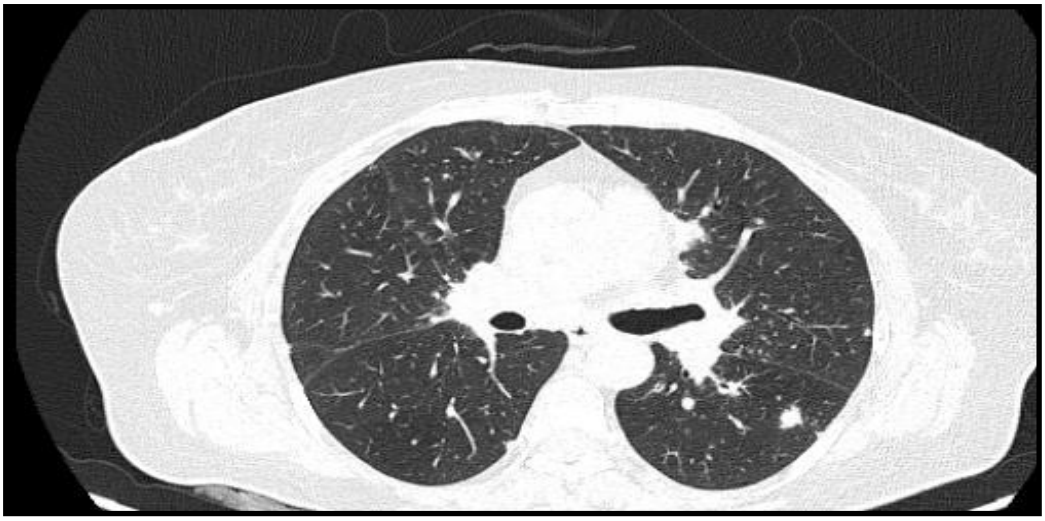

Figure 1: Nodular interface sign seen on HRCT chest with subpleural nodules in a 58 years old female

Computed tomography (CT) of the chest, both plain and contrast-enhanced, revealed multiple calcified lymph nodes in the anterior and middle mediastinal compartments, specifically involving the pretracheal, right and left paratracheal, precarinal, and subcarinal regions. Several of these lymph nodes exhibited eggshell-type calcification.

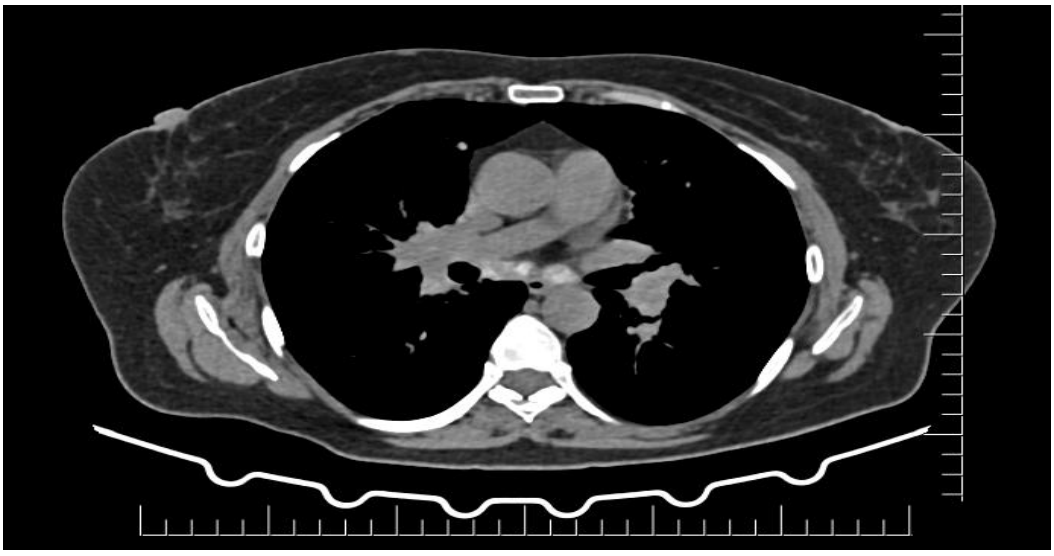

Figure 2: CT scan chest plain images showing calcified nodes in the subcarinal region

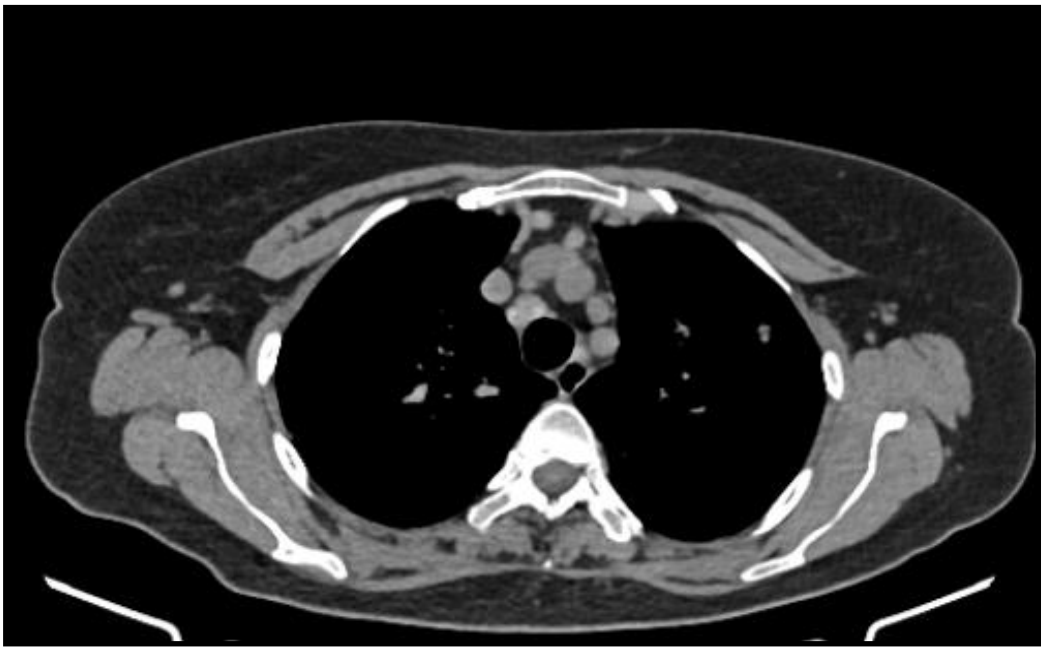

Figure 3: CT Chest showing – pre and right paratracheal faintly calcified node

High-resolution CT (HRCT) of the chest further demonstrated nodular interface signs and a reticulonodular pattern involving the peribronchovascular interstitium and subpleural regions. The nodules were diffusely distributed across the upper lobes, right middle lobe, left lingula, and both lower lobes. Axial interstitial thickening was also observed centrally, while the peripheral interstitial areas remained relatively preserved. There was no evidence of pleural or pericardial effusion, and the thoracic esophagus and mediastinal vascular structures appeared unremarkable.

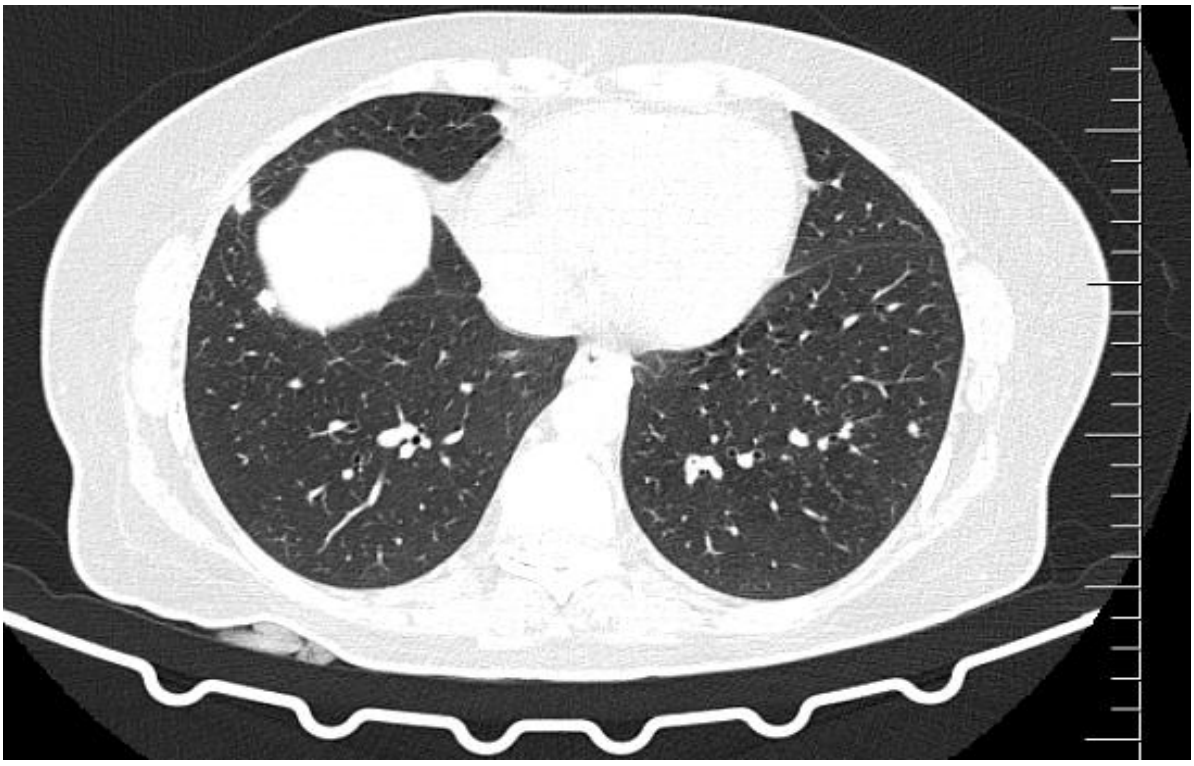

Figure 4: SUBPLEURAL NODULES

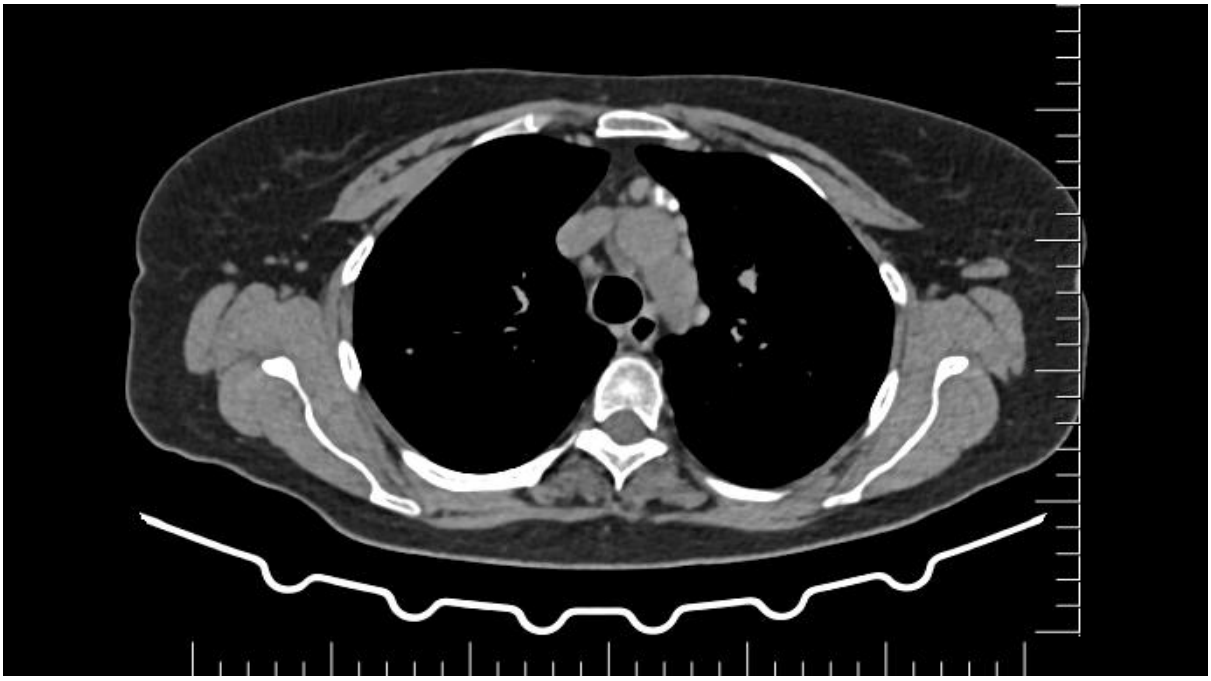

Figure 5: CT scan chest plain images showing calcified nodes in left prevascular region

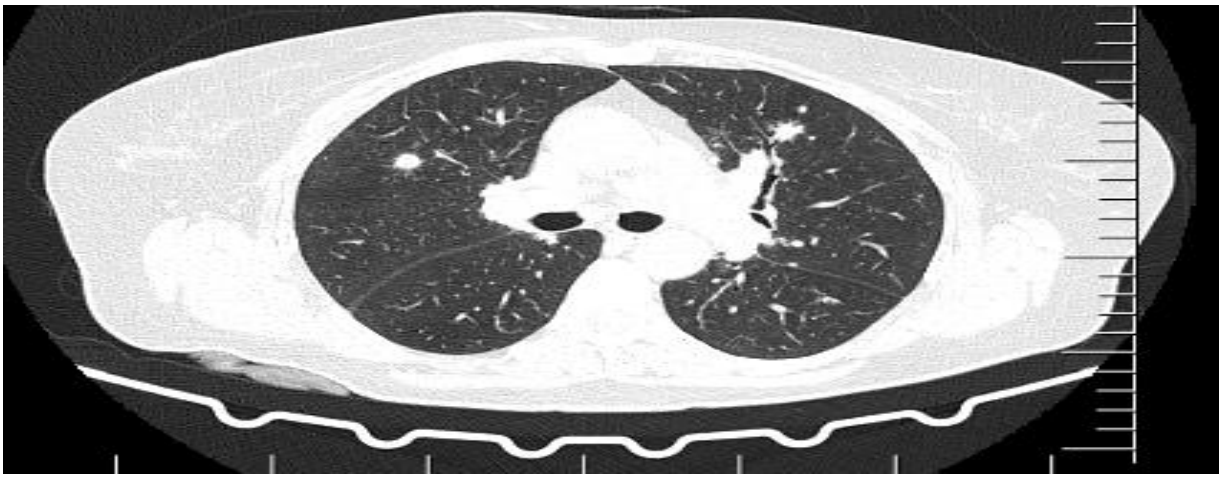

Figure 6: HRCT Chest peribronchovascular nodules

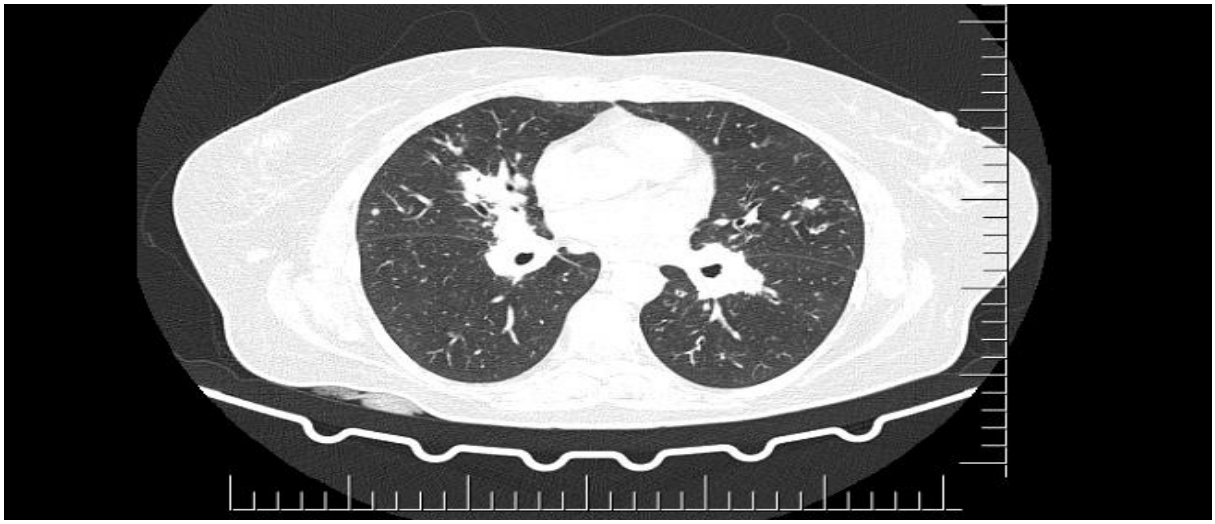

Figure 7: HRCT Chest interface sign is nodular with peribronchovascular nodularities

Incidental evaluation of the upper abdomen revealed multiple calcified lymph nodes located in the celiac axis, peripancreatic, porta hepatis, precaval, and left para-aortic regions. The largest node measured up to 20 mm in its longest axis. No hepatosplenomegaly or ascites was detected.

The pattern of widespread nodal calcifications along with perilymphatic pulmonary nodularity prompted a differential diagnosis that included healed granulomatous infections, metastatic lymphadenopathy with calcification, and sarcoidosis. A whole-body PET-CT was subsequently performed, revealing non-FDG-avid calcified lymphadenopathy, which was suggestive of a benign, non-malignant process. Additional investigations including serum angiotensin-converting enzyme (ACE) levels and exclusion of infectious or malignant causes further supported the diagnosis of sarcoidosis.

DISCUSSION

Sarcoidosis is a chronic multisystem granulomatous disease of unclear etiology, characterized histologically by the presence of non-caseating granulomas. Although it can affect virtually any organ, the lungs and intrathoracic lymph nodes are most commonly involved. The disease typically presents in adults aged 20 to 40 years but can also occur later in life, with a slightly higher incidence noted in women during their fifth and sixth decades. The pathogenesis is not fully understood; however, it is believed to result from an exaggerated immune reaction to an unknown antigen in genetically susceptible individuals [8].

Vo NH, et. al; 2022 discussed here is of particular interest due to the extensive presence of calcified lymph nodes in both mediastinal and abdominal regions, an uncommon finding in sarcoidosis. Generally, lymphadenopathy associated with sarcoidosis is bilateral and non-calcified. When calcification is present, it usually indicates chronicity or resolution of disease activity and is more frequently associated with granulomatous infections such as tuberculosis or systemic fungal diseases like histoplasmosis. In sarcoidosis, nodal calcification is less common and when encountered, tends to appear in the form of "eggshell" calcifications, a radiologic pattern noted in this patient [9].

Radiographic imaging plays a critical role in the assessment and staging of pulmonary sarcoidosis. The classic radiographic appearance includes bilateral hilar lymphadenopathy and pulmonary infiltrates, predominantly affecting the upper lung zones. In the present case, high-resolution computed tomography (HRCT) of the chest revealed multiple peribronchovascular and subpleural nodules, central axial interstitial thickening, and nodular interface signs. **Shaikh F, et. al; 2020** are consistent with a perilymphatic distribution of granulomas, which is characteristic of sarcoidosis. Subpleural nodules, while not specific to sarcoidosis, are frequently encountered in this disease due to involvement of the lymphatic routes adjacent to the pleural surfaces [10].

In addition to the thoracic findings, this patient demonstrated several calcified lymph nodes in abdominal regions, including the celiac axis, peripancreatic space, porta hepatis, precaval area, and along the para-aortic chain. The largest node measured up to 20 mm. Abdominal nodal calcification is an uncommon manifestation in sarcoidosis and more typically raises suspicion for other diagnoses. Tuberculosis and fungal infections are prime considerations, as both frequently result in extensive lymph node calcification. In regions endemic to tuberculosis, this consideration becomes particularly important. **Shivute RR. Et. al; 2020,** calcified abdominal lymphadenopathy can be seen in patients with a history of lymphoma or treated metastatic malignancy [11].

However, in this case, there was no prior history of tuberculosis, malignancy, or treatment that could explain the calcified lymph nodes. Furthermore, the patient had no constitutional symptoms such as fever, weight loss, or night sweats. A whole-body PET-CT scan was performed to evaluate metabolic activity within the calcified nodes. The scan showed non-FDG-avid lymphadenopathy, indicating the absence of active inflammatory or neoplastic processes. **Régis C, et. al; 2023** favored a benign etiology and supported the likelihood of chronic, inactive sarcoid involvement [12].

It is also important to distinguish sarcoidosis from other conditions with similar radiographic presentations. Lymphangitic carcinomatosis, for instance, can produce interstitial thickening and nodular opacities that may resemble sarcoidosis. However, lymphangitic spread of malignancy typically presents with a rapid clinical course, asymmetric radiologic findings, and is usually associated with a known primary cancer. **Voutidou S, et. al; 2025,** the findings in this case were symmetric and chronic in nature, with no evidence of a primary tumor [13].

Other granulomatous diseases, such as berylliosis and silicosis, can mimic sarcoidosis both clinically and radiologically. Beryllium exposure, for example, causes a granulomatous lung disease that closely resembles sarcoidosis but usually occurs in individuals with occupational exposure. In this case, the patient had no history of exposure to beryllium, silica, or other industrial dusts, further reducing the likelihood of these alternative diagnoses [14].

Laboratory tests were also performed to assist in the diagnostic process. Serum angiotensin-converting enzyme (ACE) levels were found to be elevated.

While elevated ACE levels can support a diagnosis of sarcoidosis, they are not specific and may also be seen in other granulomatous conditions. **Ungprasert P, et. al; 2016,** in the context of compatible imaging and absence of other likely causes, the elevated ACE level provided additional support for the diagnosis [15].

Shah HH, et. al; 2023, comprehensive clinical, radiologic, and laboratory evaluation allowed for a confident diagnosis of sarcoidosis without the need for invasive biopsy. Although histological confirmation with demonstration of non-caseating granulomas remains the gold standard for diagnosis, in selected cases with typical radiographic patterns and supportive clinical features, a noninvasive diagnosis may be considered reasonable [16].

El Jammal T, et. al; 2021 underscored the broad spectrum of sarcoidosis presentations and highlights the diagnostic challenges it can pose, especially when it presents with atypical features such as widespread lymph node calcification. The case also illustrates the value of advanced imaging techniques, such as HRCT and PET-CT, in differentiating sarcoidosis from other granulomatous and neoplastic conditions [17].

Sarcoidosis should be considered in the differential diagnosis of patients presenting with diffuse lymphadenopathy and pulmonary nodules, even when calcification is present. Recognition of less common imaging findings, such as extensive calcified lymphadenopathy in thoracic and abdominal regions, is crucial for avoiding misdiagnosis. **Tana C, et. al; 2020** approached integrating clinical evaluation, imaging, laboratory results, and, when necessary, histopathology remains key to the accurate diagnosis and management of sarcoidosis.

Clinical Significance

This case highlights a rare and underrecognized radiological presentation of sarcoidosis—extensive calcified lymphadenopathy involving both mediastinal and abdominal nodal groups. Such findings may initially mimic metastatic disease or healed infectious granulomatous processes like tuberculosis, leading to diagnostic uncertainty. However, when these imaging features coexist with characteristic pulmonary nodularity and interstitial patterns, sarcoidosis should be strongly considered. Clinicians and radiologists must remain alert to such atypical imaging findings to avoid unnecessary invasive investigations and misdiagnosis. Integration of radiological patterns with clinical evaluation and supportive laboratory data (such as serum ACE levels) can allow a confident diagnosis, especially when invasive biopsy is not feasible or warranted. This case reinforces the diagnostic spectrum of sarcoidosis and the essential role of high-resolution imaging in identifying and interpreting less common manifestations, which ultimately contributes to better patient care and targeted therapy.

Conclusion

Sarcoidosis, while classically presenting with non-calcified mediastinal lymphadenopathy and pulmonary nodules, may occasionally manifest with widespread nodal calcifications, including abdominal involvement. This case emphasizes the importance of recognizing such atypical imaging presentations and integrating them with clinical findings to reach a probable diagnosis. High-resolution CT imaging, along with PET-CT and relevant laboratory investigations, can aid in distinguishing sarcoidosis from mimics such as infectious granulomas or malignancies. Prompt identification of such variants can help avoid misdiagnosis and guide appropriate management in clinically ambiguous presentations of sarcoidosis.

CONFLICTS OF INTEREST

Authors declared that there is no conflict of interest.

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All necessary consent & approval was obtained by authors.

CONSENT FOR PUBLICATION

All necessary consent for publication was obtained by authors.

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AUTHOR CONTRIBUTIONS

All authors contribute significantly in this manuscript.

AUTHOR INFORMATION

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