CASE REPORT

Case Report: Sarcoidosis with azygos vein enlargement mimicking metastatic cancer [version 1; peer review: 1 approved, 1 approved with reservations]

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Abstract

Sarcoidosis is a systemic disease with heterogeneous clinical manifestations that is characterized histologically by the presence of noncaseating granulomas in the affected organs. It can be a diagnostic challenge, especially when mimicking malignancy or fungal infections. Previous case reports of sarcoidosis presenting with multiple masses are highly suggestive of infectious or malignant etiology. In this case, our patient presented with enlarged lymph node and was found to have innumerable nodules in the mediastinum, lungs, and liver. Azygos vein enlargement was also seen on radiological imaging, and malignancy was highly suspected; hence, an extensive workup was conducted, including laboratory, radiology and biopsy evaluation, which were diagnostic of sarcoidosis. Our case showed the importance of correlation of the history, physical examination, radiological and histopathologic studies in confirming the diagnosis and the need to rule out other serious infections and malignancies, especially with azygous vein enlargement, which can sometimes be missed in chest radiograph.

Keywords

Sarcoidosis, Malignancy, Liver mass, Azygous vein

Open Peer Review

Approval Status

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1. Marios Rossides , Karolinska Institutet, Stockholm, Sweden		
2. Ichiro Mizushima , Kanazawa University Hospital, Kanazawa, Japan		
Any reports and responses or comments on the article can be found at the end of the article.		

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Author roles: **Qasim A:** Conceptualization, Writing – Original Draft Preparation; **Kousa O:** Writing – Original Draft Preparation; **Mansour M:** Writing – Original Draft Preparation; **Aly AK:** Resources, Writing – Original Draft Preparation; **Awad D:** Writing – Review & Editing; **Kousa H:** Writing – Original Draft Preparation; **Addasi Y:** Writing – Review & Editing; **Abuhazeem B:** Writing – Review & Editing; **Andukuri V:** Supervision, Writing – Review & Editing

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Introduction

Sarcoidosis is systemic inflammatory condition of unknown etiology that is characterized histologically by the presence of noncaseating granulomas in the affected organs. It is called the ‘great mimicker’ because it can present in various ways similar to other diseases. It can affect multiple organ systems, but most commonly involves the lungs and the lymph nodes. Other less commonly involved organs include the eyes, skin, liver, spleen, bone marrow, heart and brain^{1,2}. The age adjusted annual incidence of sarcoidosis in the united states is 35.5 per 100,000 for African Americans compared with 10.9 per 100,000 for Caucasians, according to a five-year cohort study³. We present a case presented with asymptomatic cervical lymph node enlargement, multiple liver lesions and azygos vein enlargement, which were suggestive of malignant or infectious etiologies. However, investigations resulted in the diagnosis of the ‘great mimicker disease’ sarcoidosis.

Case presentation

A previously healthy 53-year-old Caucasian man on no regular medication presented to his primary care provider complaining of a painless slowly growing cervical lump that he noticed one month prior to presentation. Review of systems were negative for fever, weight loss, night sweat, fatigue, loss of appetite, cough, chest pain, hemoptysis, or shortness of breath. Family history was significant for lymphoma. The patient never smoked, and was not exposed to any chemicals at work. Physical examination showed normal vital signs and enlarged right cervical lymph nodes. The rest of the physical examination were unremarkable. Initial laboratory workup showed normal complete blood cell count and basic metabolic panel. (Table 1). A decision to proceed with fine needle aspiration was taken, which

showed a non-necrotizing inflammatory reaction. Therefore, a core biopsy was recommended to rule out lymphoma and he was referred to the rheumatology clinic for possible sarcoidosis.

Three months after the initial presentation, he was seen in the rheumatology clinic; further workup was ordered, including an angiotensin-converting enzyme level which was normal, and chest radiograph (CXR), which showed azygous vein enlargement and thus a high suspicion of malignancy (Figure 1). Next, computed tomography (CT) scan of the chest was done and it showed pathologic lymph node enlargement within the thoracic inlet and mediastinum, innumerable bilateral small pulmonary nodules, and multiple liver cystic lesions concerning for metastatic disease. (Figure 2–Figure 4). Further metastatic workup with CT abdomen/pelvis showed multiple hepatic cysts without any other organ involvement (Figure 5). At the same time, histoplasma antigen/antibody were negative, and his erythrocyte sedimentation rate was within normal limit (Table 2)

One month later, the patient was referred to the pulmonary clinic and underwent general surgery for an excisional biopsy on the most accessible lymph node, which showed non-caseating granulomas without evidence of malignancy, fungal or mycobacterial infection, and confirmed the diagnosis of sarcoidosis. The patient was subsequently started on tapered prednisone (40 mg for two weeks then 20 mg for two weeks then 10 mg for one month). Three months later, he had repeated imaging which showed the same lesions in the lungs and the liver that are of the same size. Therefore, as he was completely asymptomatic, a decision to discontinue prednisone with 1-year radiology imaging follow-up was taken.

Table 1. Complete blood count and blood chemistry.

Component (latest reference range, units)	On first presentation	3 months after first presentation	5 months after first presentation
Glucose (70–100 mg/dl)	88	102 (High)	119 (High)
BUN (6–24 mg/dl)	11	12	11
Creatinine (0.60–1.30 mg/dl)	0.84	0.91	1.06
Sodium (135–145 mmol/l)	139	140	142
Potassium (3.7–5.1 mmol/l)	4.8	4.5	4.5
Chloride (96–110 mmol/l)	102	106	109
Calcium (8.5–10.5 mg/dl)	9.4	9.4	9.4
Total Protein (6.0–8.4 g/dl)	8.2	7.8	8.2
Albumin (3.5–5.0 g/dl)	4.5	4.2	4.0
Aspartate transaminase (10–40 U/l)	26	29	38
Alkaline phosphatase (33–138 U/l)	118	103	96
Bilirubin, total (0.0–1.5 mg/dl)	0.5	0.5	0.5
Alanine transaminase (12–78 U/l)	39	50	65
White blood cells (4.0–12.0×10 ⁶ /μl)	6.8		
Red blood cells (4.30–5.90×10 ⁶ /μl)	5.50		
Hemoglobin (13.5–17.5 g/dl)	16.4		
Hematocrit (39.0–55.0%)	50.1

Figure 1. Chest x-ray showing right paratracheal soft tissue prominence (arrow) with ill-defined medial border consistent with mediastinal origin. Possibly Azygous vein enlargement.

Figure 2. Sagittal (A) and coronal (B) images in lung window showing multiple nodules in centrilobular (white arrowheads) and subpleural (black arrowheads) location consistent with peri lymphatic distribution that can be seen in cases of sarcoidosis. Incidental liver cysts are also noted.

Figure 3. CT chest scan showing enlarged mediastinal lymph node measuring 4.5 cm.

Figure 4. CT image showing the enlarged mediastinal lymph node and the hepatic nodules.

Figure 5. Axial abdominal CT imaging showing multiple liver masses.

Table 2. Laboratory analysis for granulomatous disease markers.

Component (reference, units)	3 months after first presentation
Angiotensin converting enzyme (14–82 U/l)	30
Sedimentation rate (0–15 mm/h)	8
Histoplasma antibody (negative)	Negative

Discussion

The clinical manifestations of sarcoidosis vary and can range from asymptomatic disease detected incidentally on imaging studies to the presence of constitutional symptoms and symptoms attributed to the organ system involved, to multiorgan failure^{1,2}. The diagnosis of sarcoidosis requires fulfillment of certain criteria, which include existence of typical clinical and radiological findings, histopathological evidence of noncaseating granulomas, and exclusion of other causes of granulomatous inflammation⁴.

The azygos vein is formed by the union of the ascending lumbar vein and the right subcostal vein. It is usually too small to be seen on chest x-ray. The enlargement of the azygos vein on chest x-ray can be seen in multiple diseases, such as congestive heart failure, inferior vena cava thrombosis, and intrathoracic malignancy⁵.

In this report, we present a patient with asymptomatic cervical lymph node and azygos vein enlargements, with innumerable

lung bilateral nodules, hilar, para-esophageal and mediastinal lymph node enlargement and multiple liver nodules which were highly suspicious for malignancy or fungal infection. However, histological evaluation was consistent with sarcoidosis. To our knowledge, this is the first reported case of sarcoidosis and azygos vein enlargement. Hence, we conducted a systematic review of the literature for studies published from 1960 to October 2019 in PubMed, Scopus, Web of Science, and Cochrane Central databases. The following search terms were used: “sarcoidosis”, “azygos vein enlargement” and “malignancy”. Our search was limited to individuals aged 18 years and older. Our search revealed a total of three patients. None of the cases showed azygos vein enlargement.

Our findings were similar to previous cases reported by Oketani *et al.*⁶ who were among the first to report a case of sarcoidosis mimicking metastatic cancer. They reported a case of a 49-year-old female who was found to have mediastinal and intraabdominal lymphadenopathy on radiologic imaging, in addition to presence of space occupying lesions in the liver and the spleen, which raised suspicion for metastatic hepatocellular cancer. However, histologic examination of liver biopsy specimen showed evidence of noncaseating epithelioid granulomas suggestive of sarcoidosis, which responded to treatment with steroids. Giovinale *et al.*⁷ reported another case of a 55-year-old female who presented with weight loss and abnormal liver function tests. Imaging revealed the presence of abdominal lymphadenopathy, as well as hepatic and splenic lesions, which were thought to be related to metastatic cancer, as the patient has family history of colorectal cancer. However, histological examination of specimens obtained during exploratory laparotomy showed chronic granulomatous inflammation, and the

work up for neoplasia was negative⁷. Finally, Jafari *et al.*⁸ reported a case of a 39-year-old male who was found to have hilar lymphadenopathy and a hepatic nodule on radiologic imaging, which were initially thought to be related to metastatic cancer; however, biopsy confirmed chronic granulomatous inflammation and a diagnosis of sarcoidosis was made after ruling out tuberculosis.

Conclusion

Azygous vein enlargement is a commonly missed finding on chest radiograph which can be a sign of underlying malignancy.

However, it can also be seen in sarcoidosis. Further appropriate tests are required to confirm the underlying etiology.

Data availability

All data underlying the results are available as part of the article and no additional source data are required.

Consent

Written informed consent for publication of their clinical details and/or clinical images was obtained from the patient/parent/guardian/relative of the patient.

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Ichiro Mizushima

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In this report, the authors described a male patient histologically diagnosed with sarcoidosis, which might have caused azygos vein enlargement. He was treated with glucocorticoids, but his lung and liver lesions did not respond to the treatment. Although this is an interesting case, the following concerns in addition to the comments of Reviewer 1 should be addressed for better understanding of this case:

1. In this case, the liver lesions are described as 'cystic lesions' or 'cysts', which generally contain air, fluids, or semi-solid material, but not massive cells. In addition, the liver lesions did not respond to glucocorticoids. Therefore, the authors are recommended to explain whether the authors diagnosed the liver lesions as sarcoidosis-associated lesions or not, and if they did, the criteria based on which the liver lesions could be diagnosed as sarcoidosis-associated.
2. In this case, the lung lesions had multiple nodules, which could be consistent with sarcoidosis-associated lung lesions. However, the lung lesions did not respond to glucocorticoids. Therefore, it is necessary for the authors to clarify whether the authors diagnosed the lung lesions as sarcoidosis-associated lesions or not.
3. Lymphadenopathy was histologically confirmed to be associated with sarcoidosis in this case. Azygos vein enlargement was presumed to be caused by mediastinal lymphadenopathy. However, the response of the lymph node lesions and azygos vein enlargement to treatment with glucocorticoids was not described in the original manuscript. The authors should clarify these issues.

Is the background of the case's history and progression described in sufficient detail?

Yes

Are enough details provided of any physical examination and diagnostic tests, treatment given and outcomes?

Partly

Is sufficient discussion included of the importance of the findings and their relevance to future understanding of disease processes, diagnosis or treatment?

Yes

Is the case presented with sufficient detail to be useful for other practitioners?

Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Rheumatology

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Author Response 02 May 2021

Abdallah Qasim, Creighton University Medical Center, USA

Thank you for your time and efforts to evaluate this case report.

1 - The cystic appearance of the lesions in the liver is what made malignancy on top of our differential diagnosis which prompted us to do an excisional biopsy of one of the accessible lymph nodes that did not show malignancy and showed evidence of non-caseating granulomatous disease. Work up for other granulomatous diseases was negative. the diagnosis was made that this is a case of sarcoidosis. And looking in the literature there were cases reported of atypical hepatic sarcoidosis lesions that were cystic; Giovinale M, Fonnesu C, Soriano A, Cerquaglia C, Curigliano V, Verrecchia E, De Socio G, Gasbarrini G, Manna R. Atypical sarcoidosis: case reports and review of the literature. Eur Rev Med Pharmacol Sci. 2009 Mar;13 Suppl 1:37-44. PMID: 19530510.

2 - Even though the lesions didn't respond to steroid, we still think that he has steroid-resistant sarcoidosis and the lesions in the lung are due to sarcoidosis and most likely the liver lesions as well. and because the patient is asymptomatic so the decision was made to observe the patient.

3 - The azygous vein enlargement didn't change after treatment with steroids as the lung and liver lesions.

Competing Interests: No competing interests were disclosed.

Reviewer Report 18 September 2020

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In this case report, the authors describe a case of a man in his 50s with sarcoidosis presenting with a cervical lump (enlarged lymph node), multiple abnormalities in CT chest and abdomen suspected for malignancy and azygos vein enlargement in chest X-ray.

The case report is complete with all necessary information on clinical presentation, history, examination, and necessary imaging and lab results and follow-up of up to a year. Reporting of imaging and lab findings is of adequate quality. The authors also conducted a literature search to identify similar cases.

Although it is common practice to exclude malignancy during sarcoidosis diagnosis, this report highlights the fact that azygos vein enlargement may mislead physicians and increase the suspicion for malignancy and away from sarcoid granulomatous inflammation. Raising awareness on this issue is clinically useful.

There are a few minor issues with this case report that the authors should address:

1. Introduction: Are there any more contemporary estimates of sarcoidosis incidence? The article the authors cited is from 1997.
2. Were pulmonary function tests performed in this patient?
3. Could the authors explain why the patient was started on prednisone?
4. Discussion: The authors mentioned that “the diagnosis of sarcoidosis requires fulfillment of certain criteria [...]”. There are no evidence-based ‘criteria’ for diagnosing sarcoidosis and authors should rephrase to make this explicit.
5. Discussion: Azygos vein is misspelled as “azygous” vein; it should be corrected.
6. Conclusion: The authors stated that azygos vein enlargement is usually missed in chest X-rays but do not provide any reference to support this statement.
7. Figure 1: All abnormalities seen on the chest X-ray should be described in the figure legend.

Is the background of the case’s history and progression described in sufficient detail?

Yes

Are enough details provided of any physical examination and diagnostic tests, treatment given and outcomes?

Yes

Is sufficient discussion included of the importance of the findings and their relevance to future understanding of disease processes, diagnosis or treatment?

Yes

Is the case presented with sufficient detail to be useful for other practitioners?

Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Medicine and Clinical Epidemiology

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

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