Case Report

Sarcoidosis Presenting as Acute Respiratory Distress Syndrome

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Sarcoidosis is a multisystem granulomatous disease of unknown origin. It typically involves the lungs and mediastinal lymph nodes in a chronic fashion. However, acute syndrome has been reported possibly in response to systemic release of proinflammatory cytokines. Acute pulmonary manifestations, especially acute respiratory failure or acute respiratory distress syndrome, remain extremely uncommon in individuals without a prior diagnosis. We present the case of a 41-year-old African American female, who presented with ARDS. An extensive workup into the cause of her illness remained negative, and she subsequently succumbed to her illness. A diagnosis of sarcoidosis was made upon autopsy, after exclusion of other granulomatous illness. The case highlights the need to consider this uncommon diagnosis in patients with unexplained ARDS to guide therapy.

1. Introduction

Sarcoidosis is a multisystem granulomatous disease of unknown etiology. Frequently affecting the mediastinal lymph nodes and lungs, cutaneous, hepatic, and ocular manifestations are also common. It can also involve the myocardium, central nervous system, spleen, and upper respiratory tract. Involvement is primarily in the form of nonnecrotizing granuloma formation, in response to T-cell-mediated delayed hypersensitivity reaction, recruiting macrophages and release of inflammatory cytokines TNF-a and IL-2. Pulmonary involvement is usually slow, leading to a chronic interstitial lung disease with progressive dyspnea, cough, and fatigue ailing affected individuals. Acute pulmonary presentations are uncommon and typically occur in advanced sarcoidosis in response to infection, bronchospasm, or injury causing deterioration of the respiratory status. Even less common is an acute initial presentation with respiratory failure in a previously undiagnosed patient, with only a handful of cases reported in the English literature. We describe one such case of a young woman with acute respiratory distress syndrome and respiratory failure diagnosed as sarcoidosis posthumously (Figures 1 and 2).

2. Case

A 41-year-old African American female presented to the emergency department with a cough, dyspnea, fevers, chills, night sweats, and fatigue.

She had never experienced pulmonary symptoms two weeks before presentation when she developed a cough and fever and was prescribed oral levofloxacin for pneumonia by her primary care physician. Completing a 7-day course of antibiotics, with unabating symptoms and worsening dyspnea, she presented to the emergency department for further treatment.

The examination was remarkable for tachypnea with a respiratory rate of 30/min, hypoxemia with an oxygen saturation of 87% in room air, and diffuse bilateral crackles, without jugular venous distension, or lower extremity edema.

Blood test was significant for white blood cell count of 30,000/µL, lactic acid of 5 mEq/L, and a normal metabolic panel. Arterial blood gas revealed a pH of 7.17, PaCO₂ of 50 mmHg, HCO₃ of 19 mmol/L, PaO₂ of 65.3 mmHg, and SaO₂ of 87%.

A CT-PE of the chest showed bilateral extensive multifocal infiltrates with significant hilar and mediastinal lymphadenopathy and no evidence of pulmonary embolism.
She was intubated for respiratory distress and admitted to the medical intensive care unit, with a tentative diagnosis of sepsis secondary to pneumonia, and started on broad-spectrum antibiotics.

A parasite smear and initial blood cultures were negative. Bronchoscopy done on the day of admission showed mild diffuse erythema without hemorrhage. Given the patient’s repeated desaturation during the procedure, transbronchial biopsies were not performed and the procedure terminated early. Lavage was sent for cytology, bacterial, mycobacterial, and fungal stain, and culture.

An echocardiogram showed a hyperdynamic left ventricle with an estimated ejection fraction of 70% with severe right ventricular dilatation and hypokinesis. Right ventricular systolic pressure was estimated at 80 mmHg with a tricuspid annular plane systolic excursion (TAPSE) of 1.3.

She continued to worsen, with worsening hypoxia and difficulty with mechanical ventilation, ultimately requiring airway pressure release ventilation and inhaled epoprostenol. Bronchoalveolar lavage remained negative, for bacteria, fungi, or Pneumocystis jirovecii sp.

Workup was expanded to include fungal blood cultures, histoplasma and coccidioides serology, and viral respiratory panel. Respiratory syncytial virus, adenovirus, influenza, parainfluenza, human metapneumovirus, human immunodeficiency virus (HIV), Ebstein–Barr virus (EBV), and

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**Figure 1:** Histopathology. (a) Low-power view of lung parenchyma showing multiple giant cell formation and granuloma formation. (b) Giant cell and granuloma formation in hepatic parenchyma. (c) High-power view of granulomas and giant cells in the lymph node.

**Figure 2:** Radiographic appearance at presentation.
cytomegalovirus (CMV) were negative. Leptospira and pertussis remained negative. Noninfectious workup along autoimmune lines including antinuclear antibody (ANA), anti-neutrophilic cytoplasmic antibody (ANCA), rheumatoid factor (RF), anti-cyclic citrullinated peptide (anti-CCP), and anti-Smith, anti-SCL70, anti-myeloperoxidase (anti-MPO), anti-ribonucleoprotein (anti-RNP), and anti-PR3 antibodies all returned negative, with angiotensin-converting enzyme (ACE) levels on the high end of normal.

She continued to worsen, requiring hemodynamic support with norepinephrine, epinephrine, and vasopressin, with worsening hepatic function and oliguric renal failure.

On the third hospital day, she continued to be febrile. Morning ABG showed a pH of 6.99, PaCO₂ of 47.4 mmHg, HCO₃ of 10 mmol/L, PaO₂ of 88.2 mmHg, SO₂ of 83.2%, and lactic acid level of 9 mEq/L; after prompt discussion with the family, the decision was made to start the patient on continuous renal replacement therapy (CRRT) and consider extracorporeal membrane oxygenation (ECMO) support. However, the patient developed pulseless electrical activity (PEA) arrest before CRRT could begin, with the eventual demise of the patient.

An autopsy revealed noncaseating granulomata in hilar and mediastinal lymph nodes and pulmonary, splenic, and hepatic parenchyma. Gram, Ziehl–Neelsen, and special stains were negative for bacterial, mycobacterial, fungal, or parasitic organisms.

Acid-fast bacillary and fungal cultures remained negative. No crystals were seen on polarized microscopy.

3. Discussion

Overall, African Americans have a threefold age-adjusted annual incidence of sarcoidosis when compared to Caucasians [1].

There is no diagnostic laboratory or imaging study available. A joint consensus statement recommends three criteria for the diagnosis of sarcoidosis: (a) a compatible clinical and radiologic presentation, (b) pathologic evidence of noncaseating granulomas, and (c) exclusion of other diseases with similar findings [2]. Clinical suspicion is critical for diagnosing sarcoidosis, a constellation of consistent symptoms, and supporting imaging is of paramount importance.

Although the initial diagnosis is made on clinico-angiographic findings, a tissue biopsy is warranted to confirm the diagnosis. The presence of noncaseating granulomas demonstrated on microscopic evaluation is typical. However, other granulomatous disorders need to be excluded before a determination can be made. The diagnosis is made even more difficult when clinical suspicion is low, owing to different presentations like in our case.

Our patient met the Berlin criteria for ARDS at presentation. Owing to the lack of a satisfactory underlying diagnosis, an extensive workup [3] was performed which

| Author et al. | Year | Patient | Symptoms | Duration of symptoms | Radiographic findings | Biopsy | Treatment and outcome |
|---------------|------|---------|----------|----------------------|----------------------|--------|-----------------------|
| Sahn et. al.  | 1974 | 26, female | Dyspnea, productive cough, and chest pain | 1 month | Bilateral diffuse infiltrates without adenopathy, Diffuse small nodular opacity, with bilateral lymphadenopathy, Extensive bilateral interstitial infiltrates | Open lung biopsy | Improvement with prednisone |
| Suyama et. al. | 1990 | 55, male | Dyspnea and fever | 10 days | Bilateral reticulonodular opacities | Transbronchial lung biopsy | Improvement with prednisone |
| Sabbagh et. al. | 2002 | 50, male | Dyspnea and productive cough | 3 weeks | Bilateral pulmonary infiltrates, Bilateral ground glass opacity, Bilateral patchy ground glass opacity with interlobular thickening and scattered nodules | Transbronchial lung biopsy | Improvement with methylprednisolone |
| Leiba et al. | 2004 | 41, female | Dyspnea | 1 week | Bilateral lymphadenopathy and confluent alveolar opacities with air bronchograms | Mediastinal lymph node biopsy | Improvement with methylprednisolone |
| Chirakalwasan et al. | 2005 | 33, male | Acute respiratory distress syndrome, Leg rash, fever, and acute respiratory failure | 4 days | Bilateral lymphadenopathy and diffuse ground glass opacities | Skin biopsy | Improvement with methylprednisolone |
| Shibata et al. | 2007 | 66, male | Dyspnea, cough, fever, malaise, and weight loss | 3 weeks | Bilateral lymphadenopathy and confluent alveolar opacities with air bronchograms | Skin biopsy | Improvement with methylprednisolone |
| Gupta et al. | 2011 | 40, male | Dyspnea, cough, fever, malaise, and weight loss | 20 days | Bilateral lymphadenopathy and diffuse ground glass opacities | Transbronchial biopsy | Improvement with methylprednisolone |
| Gera et al. | 2014 | 30, male | Dyspnea, cough, and fever | 1 week | | Transbronchial biopsy | Improvement with methylprednisolone |
| Arondi et al. | 2016 | 20, female | Dry cough, fatigue, and fever | 1 week | | Transbronchial biopsy | Improvement with methylprednisolone |
remained negative. She succumbed to her illness, primarily from worsening ARDS and right heart failure. The demonstration of granulomata in the mediastinal nodes, pulmonary parenchyma, and hepatic tissue suggested the diagnosis posthumously, which was made after staining and culture for microbial pathogens, including mycobacteria and fungi.

Sarcoidosis does not generally cause a fulminant pulmonary syndrome, as in our patient. Only scattered case reports exist of febrile illness attributed to sarcoidosis outside of the well-described Heerfordt-Waldenström syndrome, also referred to as sarcoid uveoparotid fever [4].

An acute manifestation of sarcoidosis most commonly presents as Löfgren’s syndrome, characterized by the classic triad of hilar adenopathy, erythema nodosum, and arthritis.

Lung involvement is most common in sarcoidosis. However, acute respiratory failure and acute respiratory distress syndrome are incredibly rare initial presentations of sarcoidosis, with a handful of reports in the literature [5–12]. Table 1 provides some details about reported cases.

Interestingly, acute febrile presentations appear to be extremely rare. Suyuma et al. have previously described a similar patient with high fevers and acute respiratory failure diagnosed subsequently as pulmonary sarcoidosis [12].

Previously, authors have termed a rapidly manifesting variant as alveolar sarcoidosis, owing to the acuity of onset and radiologic pattern consistent with diffuse alveolar infiltrates and presence of air bronchograms. Interestingly, most patients diagnosed with alveolar sarcoidosis also did not present with respiratory failure. Two such cases have been documented, by Sahn et al. [11] and Gera et al. [6].

An acute inflammatory syndrome is poorly understood and postulated in response to the systemic activation of T-cell-mediated immune response and activation of the interferon-gamma and interleukin-2 pathways which can then lead to the development of ARDS [8].

Sarcoidosis is not a usual cause of ARDS and is seldom cited as the underlying pathology in these patients; as our case and other cases before illustrated, it is essential to consider this in the differential for unexplained ARDS.

This is the only reported case of ARDS from an acute febrile presentation of sarcoidosis which was diagnosed posthumously, highlighting the importance of considering it in patients with ARDS from an unknown underlying disease process.

4. Conclusion

Acute respiratory failure due to ARDS is an underrecognized presentation of sarcoidosis and can be potentially fatal if not treated promptly. Physicians need to be vigilant in considering sarcoidosis as a cause of ARDS after excluding common etiologies.

Conflicts of Interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

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