Open Access Epidemiology and Prevention

Journal of Renal Endocrinology

J Ren Endocrinol 2024;10:e25158.
https://www.jrenendo.com
doi: 10.34172/jre.2024.25158

Nickan Research Institute

A case with complication of overload versus diffuse alveolar hemorrhage in the setting of systemic lupus erythematosus: a case report and literature review

Reza Asgari[1], Mohammad Amin Bazzazan[1], Sepide Hajian[2*]

Abstract
Systemic lupus erythematosus (SLE) is a complex autoimmune disease characterized by its diverse clinical manifestations, affecting multiple organ systems. Overload and diffuse alveolar hemorrhage (DAH) are part of the many complications of SLE patients. Here, we present a known case of lupus that presented with symptoms resembling acute respiratory distress syndrome (ARDS). The patient exhibited markedly elevated pressures of 215 over 157 and demonstrated a high opacity on the initial hospital admission chest radiographs, which, upon further investigations, led to a differential diagnosis between pulmonary edema due to fluid overload and DAH. Relevant treatments were administered accordingly. Notably, in this case, despite the strong indication of DAH due to the remarkably low hemoglobin levels, the patient's significant improvement resulted solely from treatments targeting fluid overload. Subsequently, a notable reduction in the patient's chest radiographic opacity was observed.
Keywords: Systemic lupus erythematosus, Diffuse alveolar hemorrhage, Pulmonary edema, Chronic hypertension, Lupus nephritis, Echocardiogram findings
Citation: Asgari R, Bazzazan MA, Hajian S. A case with complication of overload versus diffuse alveolar hemorrhage in the setting of systemic lupus erythematosus: a case report and literature review. J Ren Endocrinol. 2024;10:e25158. doi: 10.34172/jre.2024.25158.

Introduction

Systemic lupus erythematosus (SLE) is a complex autoimmune disease characterized by its diverse clinical manifestations, affecting multiple organ systems. This systemic autoimmune disorder primarily targets self-antigens, resulting in the production of autoantibodies and immune complex deposition. SLE's etiology involves genetic, hormonal, environmental, and immunological factors that contribute to its onset and progression (1-3).

Complications of SLE encompass a broad array of organ-specific and systemic issues. Lupus can involve various parts such as the kidneys, lungs, heart and blood vessels, skin, and other organs. These complications can significantly impact the quality of life for patients. Healthcare providers diagnose SLE through a comprehensive evaluation of symptoms, physical examinations, X-rays, and laboratory tests. The diagnosis of SLE can pose challenges due to the non-specific nature of its initial signs and symptoms, which often mirror those of other diseases, making it challenging to differentiate (1,4).

In this instance, we present a documented case of lupus that manifested symptoms akin to acute respiratory distress syndrome (ARDS). The patient displayed markedly elevated blood pressure readings of 215 over 157 and exhibited pronounced opaqueness in the initial chest X-rays upon admission to the hospital. Further investigations prompted a diagnostic differentiation between pulmonary edema caused by fluid overload and Diffuse alveolar hemorrhage (DAH). Treatment was administered in alignment with the identified condition. Noteworthy in this scenario is the significant improvement experienced by the patient, solely attributable to treatments addressing fluid overload, despite the strong indications pointing to DAH due to notably low hemoglobin levels. Subsequent observations revealed a marked reduction in the opacity visible in the patient's chest X-rays.

Case Presentation

A 33-year-old female patient with a history of stage 4 lupus nephritis and chronic hypertension presented to the emergency department of Velayat Hospital in Qazvin. The patient had been prescribed mycophenolate mofetil and

Received: 22 May 2024, Accepted: 13 October 2024, ePublished: 29 October 2024

[1]School of Medicine, Qazvin University of Medical Sciences, Qazvin, Iran.
[2]Department of Nephrology, Velayat Hospital, Qazvin University of Medical Sciences, Qazvin, Iran.
***Corresponding Author:** Sepide Hajian, Email: dr.sepide_hajian@yahoo.com and s.hajian@qums.ac.ir

Implication for health policy/practice/research/ medical education

Systemic lupus erythematosus (SLE) can cause complications like diffuse alveolar hemorrhage and fluid overload. We present a lupus case with acute respiratory distress syndrome -like symptoms, high blood pressure, and chest radiographic opacity. Despite low hemoglobin levels suggesting diffuse alveolar hemorrhage, the patient improved with fluid overload treatment, leading to reduced chest opacity.

corticosteroids for her condition. She exhibited an abrupt onset of dyspnea and orthopnea, accompanied by wheezing and a productive cough. The patient also experienced a sense of nausea accompanied by vomiting on three separate occasions. The laboratory findings indicated a hemoglobin concentration of 7.6 g/dL, creatinine level of 3.9 mg/dL, and blood urea nitrogen (BUN) level of 49 mg/dL. The patient's blood pressure was recorded at 215/156 mmHg, while the pulse rate was noted at 126, and the respiratory rate at 52. The patient's anemia was most likely due to chronic kidney disease and a decrease in erythropoietin production. The oxygen saturation was measured at 65% without the aid of a ventilator and 94% with the assistance of a ventilator. Additionally, the patient displayed crackling sounds in the lungs. The echocardiogram conducted showed noteworthy results. Specifically, there was an ejection fraction of 35%-40%, with mild left ventricular and left atrial enlargement. In addition, there was moderate aortic insufficiency, along with mitral and tricuspid regurgitation. Moreover, the echocardiogram revealed the presence of a small-size circumferential pericardial effusion. The chest X-ray which was done following admission demonstrated diffuse alveolar infiltration and pulmonary opacity and the alveolar pattern was revealed in the patient's CT-scan imaging result (Figures 1 and 2).

The clinical presentation of the discussed patient prompted consideration of several potential differential diagnoses, including 1) pulmonary edema and ARDS attributable to either influenza or COVID-19 infection, 2) DAH, a significant cause of ARDS in individuals with lupus, 3) Lupus pneumonitis, and 4) Volume overload. The medical team attempted to conduct a bronchoscopy procedure in order to eliminate the possibility of DAH. However, the patient declined to provide consent for the said procedure. Also, the pulmonary edema was highly unlikely to be caused by viral infection due to anemia and severe hypertension. The patient received conservative treatment for both DAH and volume overload, comprising high-dose furosemide and several antihypertensive drugs, namely labetalol, serum nitroglycerin, clonidine, implores (a combination of atenolol and amlodipine), valsartan, prazosin, and hydralazine. Additionally, the patient continued receiving 1 mg/kg of prednisolone, which had already been part of her treatment regimen. The patient was administered three units of packed red cells to address the patient's anemia. The patients' hypertension, anemia, and pulmonary opacity gradually resolved over the course of five days, confirming that volume overload was the primary cause of the patient's condition. The improvements are seen in chest X-ray and CT- scans as well (Figures 3 and 4).

Discussion

This study presents a case study of a patient with lupus nephritis, characterized by severe hypertension, dyspnea, orthopnea, tachycardia, tachypnea, low oxygen saturation, and low hemoglobin concentration. The chest radiograph showed diffuse alveolar infiltration and pulmonary opacity. The most likely diagnoses in the case under consideration were volume overload and DAH. However, the patient's refusal to undergo a bronchoscopy precluded a definitive diagnosis of DAH. Consequently, a treatment regimen comprising prednisolone and antihypertensive drugs was administered to manage the patient's symptoms. Over a period of five days, the patient's pulmonary opacity and hypertension gradually resolved. To the best of our knowledge, this article represents the first

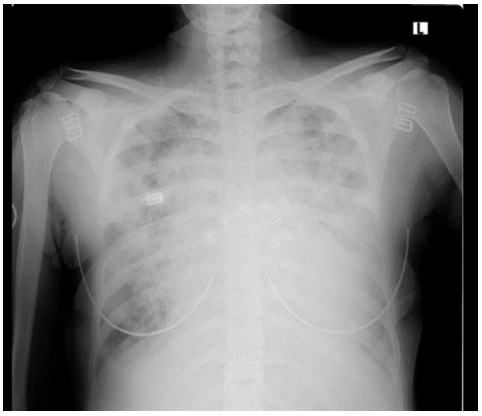

Figure 1. Chest x-ray before treatment.

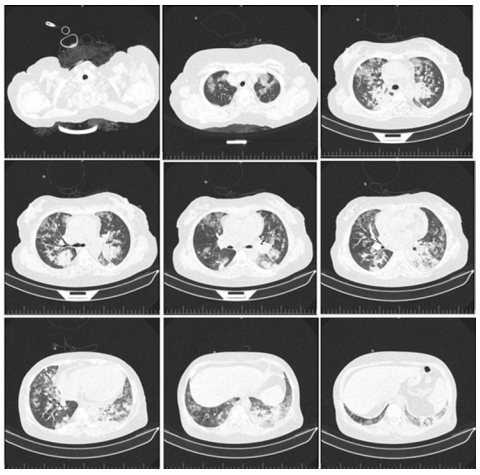

Figure 2. Chest CT-scan before treatment.

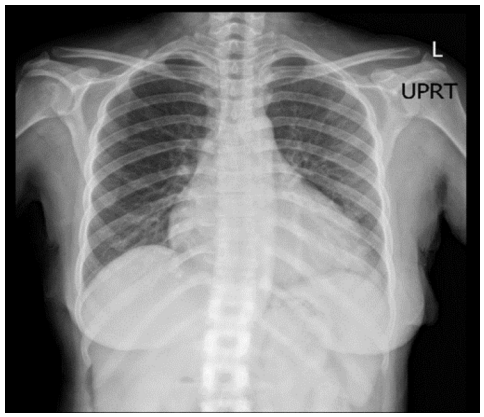

Figure 3. Chest x-ray after treatment.

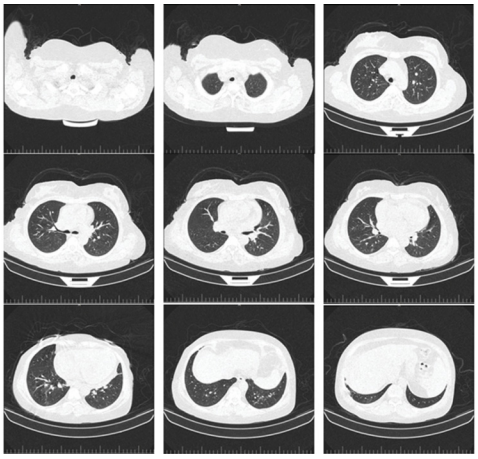

Figure 4. Chest CT-scan after treatment.

documented instance of diffuse pulmonary infiltration and hypertension solely caused by volume overload.

Another differential diagnosis was ARDS due to COVID-19 infection which was probable due to the recent pandemic that has been wreaking havoc around the world. In cases with ARDS due to COVID-19, respiratory symptoms are usually similar to the current case; however, COVID-19 patients present with fever which was absent in our case. Also, low hemoglobin concentration and severe hypertension are not related to covid infection (5). Lupus pneumonitis is a severe manifestation of SLE, characterized by inflammation of the lung tissue leading to symptoms like fever, cough, chest pain, and difficulty breathing. Diagnosis involves a thorough assessment of clinical symptoms, imaging studies that reveal lung infiltrates, and the exclusion of other potential causes of respiratory problems in patients with lupus. Lupus pneumonitis was another probable diagnosis but was ruled out due to severe hypertension, low hemoglobin levels, and lack of fever in our case (6-8).

Diffuse alveolar hemorrhage represents one of the most devastating complications of SLE. This condition is typically characterized by the sudden onset of symptoms such as dyspnea, cough, fever, hemoptysis, or blood-stained sputum, which may develop acutely over a period of hours or days. Given the severity of this complication, it is essential that patients with SLE be monitored closely for early signs of DAH, and that appropriate interventions be initiated promptly to prevent further respiratory compromise (9). Lundgren et al described a case report of a 36-year-old female who presented with DAH and exhibited similar clinical features to those observed in our case, such as hypertension, tachycardia, and tachypnea. However, there were notable differences in the presentation of the two cases. In contrast to our case, Lundgren and colleagues' patient had normal oxygen saturation initially, which gradually declined. Additionally, the patient exhibited hemoptysis, bloody sputum, and bilateral nonpitting edema. The authors noted a gradual decline in the patient's hemoglobin concentration. The patient was treated with high-dose steroids, hydroxychloroquine, venovenous extracorporeal membrane oxygenation, and inotrope/vasopressor medications, but these interventions did not prevent the patient's unfortunate demise (10). Patel and Lipchik presented a case study with similar symptoms to the one we are currently examining, but their patient also experienced hemoptysis. Following a bronchoscopy, it was conclusively determined that the patient in question was suffering from DAH and was subsequently treated using venovenous extracorporeal membrane oxygenation (11). In a recent study, two cases of DAH were presented. Both patients presented with symptoms such as hemoptysis, low-hemoglobin concentration, and oxygen desaturation. Despite receiving treatment with methylprednisolone and plasmapheresis, both patients eventually passed away. This highlights the high fatality rate associated with DAH (12).

The presented cases and their respective symptoms and treatments signify that the diagnosis of volume overload caused by lupus nephritis and the subsequent treatment approach implemented were appropriate and effective in addressing the current case. This article elucidates the significance of accurately distinguishing between pulmonary infiltration and opacity as well as severe hypertension caused by volume overload or DAH, in order to avert DAH fatality. The aforementioned differentiation can be accomplished by means of bronchoscopy and evaluation of hemoptysis.

Conclusion

In conclusion, this case report highlights the diagnostic and therapeutic challenges encountered in managing a patient with SLE presenting with symptoms mimicking ARDS. The initial radiographic findings and markedly elevated pressures raised concerns for both fluid overload and DAH. Despite the compelling evidence of DAH, the patient exhibited a remarkable response to treatments targeting fluid overload, leading to a substantial

improvement in clinical and radiographic parameters. This case underscores the complexity of SLE and its diverse clinical presentations, emphasizing the importance of a meticulous diagnostic approach and individualized treatment strategies. Further research is warranted to elucidate the underlying mechanisms contributing to such diverse pulmonary manifestations in SLE patients, ultimately improving the management and outcomes of this intricate autoimmune condition.

Authors' contribution

Conceptualization: Sepide Hajian.
Data curation: Reza Asgari and Mohammad Amin Bazzazan.
Formal analysis: Sepide Hajian.
Investigation: Reza Asgari and Mohammad Amin Bazzazan.
Methodology: Sepide Hajian.
Project administration: Sepide Hajian.
Resources: Sepide Hajian.
Software: Sepide Hajian.
Supervision: Sepide Hajian.
Validation: Sepide Hajian.
Visualization: Sepide Hajian.
Writing–original draft: Reza Asgari and Mohammad Amin Bazzazan.
Writing–review & editing: Reza Asgari and Mohammad Amin Bazzazan.

Conflicts of interest

The authors declare that they have no competing interests.

Ethical issues

This case report was conducted in accord with the World Medical Association Declaration of Helsinki. Patient has given us a written informed consent for publication as a case report. Ethical issues (including plagiarism, data fabrication, double publication) have been completely observed by the authors.

Funding/Support

The current case report study was a self-funded project.

References

1. Fava A, Petri M. Systemic lupus erythematosus: Diagnosis and clinical management. J Autoimmun. 2019;96:1-13. doi: 10.1016/j.jaut.2018.11.001.
2. Basta F, Fasola F, Triantafyllias K, Schwarting A. Systemic Lupus Erythematosus (SLE) Therapy: The Old and the New. Rheumatol Ther. 2020;7:433-446. doi: 10.1007/s40744-020-00212-9.
3. Gaipl US, Munoz LE, Grossmayer G, Lauber K, Franz S, Sarter K, et al. Clearance deficiency and systemic lupus erythematosus (SLE). J Autoimmun. 2007;28:114-21. doi: 10.1016/j.jaut.2007.02.005.
4. Kiani R, Siddiqui MD, Tantoush H. Severe Pulmonary Hypertension as Initial Presentation of SLE: A Case Report and Literature Review. Case Rep Rheumatol. 2020;2020:6014572. doi: 10.1155/2020/6014572.
5. Alharthy A, Faqihi F, Nasim N, Noor A, Akhtar S, Balshi A, et al. COVID-19 in a patient with a flare of systemic lupus erythematosus: A rare case-report. Respir Med Case Rep. 2020;31:101252. doi: 10.1016/j.rmcr.2020.101252.
6. Wan SA, Teh CL, Jobli AT. Lupus pneumonitis as the initial presentation of systemic lupus erythematosus: case series from a single institution. Lupus. 2016;25:1485-1490. doi: 10.1177/0961203316646461.
7. Capdevila AA, Irrazábal LC, Gnocchi C, Luna MC, Rossi S, Nadal AM, et al. Respiratory Failure Due to Lupus Pneumonitis: Case Report and Review of the Literature. Clinical Pulmonary Medicine. 2003;10:136-42. doi: 10.1097/01.cpm.0000059370.04504.03
8. Aggarwal HK, Jain D, Mittal A, Rao A, Yadav RK, Jain P. Systemic lupus erythematosus presenting as fulminant lupus pneumonitis: a rare case report. Reumatismo. 2016;68:48-52. doi: 10.4081/reumatismo.2016.846.
9. Al-Adhoubi NK, Bystrom J. Systemic lupus erythematosus and diffuse alveolar hemorrhage, etiology and novel treatment strategies. Lupus. 2020;29:355-363. doi: 10.1177/0961203320903798.
10. Lundgren MC, Molitor JA, Spilseth B, Adeyi O. A Fatal Case of Diffuse Alveolar Hemorrhage in the Setting of Systemic Lupus Erythematosus: A Case Report and Review of Noninfectious Causes of Acute Pulmonary Hemorrhage in Adults. Case Rep Rheumatol. 2021;2021:6620701. doi: 10.1155/2021/6620701.
11. Patel JJ, Lipchik RJ. Systemic lupus-induced diffuse alveolar hemorrhage treated with extracorporeal membrane oxygenation: a case report and review of the literature. J Intensive Care Med. 2014;29:104-9. doi: 10.1177/0885066612464335.
12. Monsanto KDG, Zamora GT. Diffuse Alveolar Hemorrhage: A Rare Fatal Complication of Systemic Lupus Erythematosus (A Report of Two Cases). Acta Medica Philippina. 2022;56:72-6. doi: 10.47895/amp.v56i2.4246.