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Case Report

Coexistence of Systemic Lupus Erythematosus and Acute Myeloid Leukemia: A Complex Clinical Case

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ABSTRACT

This case presentation explores the rare coexistence of systemic lupus erythematosus (SLE) and acute myeloid leukemia (AML) in a single patient, highlighting the diagnostic and therapeutic challenges faced in managing both conditions. Autoimmune diseases, particularly rheumatic disorders, have been linked to myeloid neoplasms, with varying prevalence rates. The patient exhibited symptoms of pancytopenia, leading to the diagnosis of AML confirmed by myelogram findings, including Auer bodies and a translocation (8;21). The management approach involved a multidisciplinary strategy, incorporating corticosteroids for SLE and chemotherapy for AML, while addressing the risk of infection. This case underscores the importance of recognizing the interplay between autoimmune diseases and hematological malignancies, necessitating a careful balance in treatment to optimize patient outcomes.

Keywords: Systemic lupus erythematosus; Acute myeloid leukemia; Autoimmune diseases; Hematological malignancies

Introduction

Systemic lupus erythematosus (SLE) is a complex autoimmune disorder characterized by chronic inflammation and multi-organ involvement. It predominantly affects women of childbearing age and is associated with a wide array of clinical manifestations, including skin lesions, arthritis and hematological abnormalities like anemia and lymphopenia. The pathophysiology of SLE involves a combination of genetic predisposition, environmental triggers and immune dysregulation, leading to the production of autoantibodies that contribute to tissue damage[1,3]. The management of SLE often includes immunosuppressive therapies, which can complicate the clinical picture when other diseases arise.

Acute myeloid leukemia (AML) is an aggressive hematological malignancy characterized by the rapid proliferation of immature myeloid cells in the bone marrow. It

presents with symptoms related to bone marrow failure, such as fatigue, bleeding and recurrent infections. The incidence of AML is influenced by various risk factors, including previous exposure to chemotherapy, genetic predispositions and certain autoimmune diseases[2,5]. The coexistence of SLE and AML is rare, yet it poses significant diagnostic challenges due to overlapping symptoms and laboratory findings, such as cytopenia's and systemic inflammation.

Recent studies suggest a potential link between autoimmune diseases and an increased risk of developing hematological malignancies, including AML. Chronic inflammation associated with SLE may play a role in this heightened risk, as persistent immune activation can lead to genomic instability and malignancy [6][8]. The simultaneous presence of SLE and AML complicates diagnosis and treatment, necessitating a multidisciplinary approach to manage both conditions effectively[4,7]. This case report highlights the complexities of diagnosing and treating a patient with both SLE and AML, emphasizing the importance of clinical awareness and tailored therapeutic strategies.

Case Report

A 28-year-old female with a background of systemic lupus erythematosus (SLE) presented with systemic symptoms characterized by extreme fatigue, significant loss of appetite and unintentional weight reduction of 12 kg over a span of six weeks. She also experienced recurrent fevers peaking at 39°C. Physical examination revealed a notable perianal abscess. Her previous manifestations of SLE included non-erosive arthritis, pleuritis, mild pericarditis and hematological issues such as lymphopenia and autoimmune hemolytic anemia. Serological tests indicated positivity for antinuclear antibodies (ANA), anti-Ro (SSA), anti-double-stranded DNA, nucleosome, RNP and histone antibodies.

Initially, the patient was treated with corticosteroids at a dosage of 0.5 mg/kg/day and hydroxychloroquine; however, hydroxychloroquine was later stopped due to an allergic skin reaction.

Current admission

Upon her current admission, laboratory results revealed pancytopenia: hemoglobin at 4.9 g/dL (normocytic and normochromic), white blood cell count of 2,400/mm³ (with 120 neutrophils and 900 lymphocytes) and a platelet count of 14,000/mm³. C-reactive protein (CRP) levels were significantly elevated at 250 mg/L and ferritin levels reached 30,000 ng/mL **(Table 1)**. Microbiological cultures from the perianal abscess identified the presence of Klebsiella pneumoniae. A pelvic MRI indicated the presence of a posterior anal fistula without any abscess formation. A peripheral blood smear showed 60% blasts and a bone marrow aspirate confirmed the diagnosis of acute myeloid leukemia (AML) with Auer rods and translocation t(8;21).

Management

The initial management plan included a regimen of broad-spectrum antibiotics (meropenem, metronidazole and gentamicin), along with fluconazole (400 mg/day) for antifungal prophylaxis. Intravenous administration of methylprednisolone was initiated at a dose of 120 mg/day for three days, followed by a transition to oral corticosteroids at 50 mg/day. The patient was subsequently referred to the hematology department, where she received hydration therapy, leukocyte-filtered red blood cell transfusions and induction chemotherapy, resulting in a positive clinical and hematological response.

Table 1: All labs investigations during hospital admission.

Data at Diagnosis	After Treatment	Reference Range
HGB (g/dl)	6	14
MCV (fl)	78	92
MCHC (g/dl)	34	31
WBC (elements/mm³)	2800	9500
PNN	150	4800
Lymphocytes (elements/mm³)	1100	4200
Platelets (elements/mm³)	18000	410000
ANA (IU/ml)	1:80	NA
DNA Antibodies (IU/ml)	5	NA
C3 (g/l)	NA	NA
C4 (g/l)	NA	NA
CRP (mg/dl)	220	6
AST (IU/ml)	25	28
ALT (IU/ml)	45	15

Discussion

Autoimmune diseases, particularly autoimmune rheumatic disorders, have been observed in patients with myeloid neoplasms, including myelodysplastic syndromes, chronic myelomonocytic leukemia, acute myeloid leukemia (AML) and myeloproliferative neoplasms, with a prevalence ranging from 1.5% to 33%[1,2]. The coexistence of systemic lupus erythematosus (SLE) and AML is rare and presents significant clinical challenges. Apor et al. demonstrated that SLE is associated with an elevated risk of leukemia, with a standardized incidence ratio (SIR) of 2.3 (95% CI 1.9-2.7)[3]. The risk of developing myeloid neoplasms is influenced by several factors, including the chronicity and severity of autoimmune disease, the type and duration of exposure to disease-modifying antirheumatic drugs and genetic predisposition[4]. Some case studies have suggested a link with prior exposure to cytotoxic or immunosuppressive drugs[5]. However, Lofstrom et al. did not find any significant difference in the frequency of cytotoxic exposure between the case and control groups, indicating that prior exposure to these drugs may not be a major cause of AML development in SLE patients[6].

Leukopenia has been identified as a risk factor for the development of myeloid leukaemia and myelodysplastic syndrome is frequently observed. Therefore, a bone marrow evaluation should be considered in SLE patients with persistent leukopenia and long-standing anemia[6]. Immunologic dysregulation is a common characteristic of both AML and SLE. NF-kB serves as a central mediator in the activation of pro-inflammatory genes and is implicated in both AML and SLE[7,8]. Persistent NF-kB activation in chronic inflammatory conditions can override inhibitory feedback mechanisms, resulting in sustained NF-kB activity[9]. The higher incidence of cancer in patients with chronic inflammation may be partly attributed to this constitutive NF-kB activity, which exerts a pro-tumorigenic effect[4]. Additionally, no temporal relationship has been established between drug exposure and the development of myeloid neoplasia[10]. One study reported the influence of SLE latency on the onset of acute myeloid leukemia[11].

The simultaneous presence of these two conditions

complicates both diagnosis and treatment. Distinguishing between an exacerbation of SLE and the initial manifestation of AML can be complex, as both conditions may present with similar haematological abnormalities, such as anaemia and leukopenia. In this particular case, the pancytopenia observed upon admission, combined with the presence of blasts in the peripheral blood, led to a diagnosis of acute myeloid leukaemia. Confirmation through myelogram revealed Auer bodies and a translocation (8;21), clearly differentiating AML from other haematological complications associated with SLE.

The treatment of AML in a patient with SLE necessitates a carefully balanced, multidisciplinary approach. Corticosteroids, often used to manage lupus inflammation, can impact the immune response and complicate the management of leukaemia. In this case, treatment included triple antibiotic therapy to control infection, antifungal prophylaxis and corticosteroid therapy for SLE, prior to initiating AML-specific chemotherapy. This strategy aims to stabilize the patient's condition while managing both the autoimmune disease and the haematological malignancy. The prognosis for these patients depends on their response to AML treatment and the ongoing management of SLE. The presence of the (8;21) translocation is generally associated with a better prognosis in AML; however, coexistence with SLE can influence the clinical course. Close follow-up is essential to monitor potential complications, adjust therapies according to tolerance and response and prevent relapses of either disease. The limited number of similar cases reported in the literature highlights the importance of this case in enhancing our understanding of the interactions between autoimmune diseases and haematological cancers. Further studies are needed to explore the mechanisms underlying this coexistence and to develop optimal treatment protocols.

Conclusion

This case illustrates the clinical complexity of the coexistence of SLE and AML, emphasizing the associated diagnostic and therapeutic challenges. It also underscores the importance of a multidisciplinary approach and increased vigilance in the follow-up of these patients to maximize survival chances and improve quality of life.

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