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A Case Report of Pediatric Systemic Lupus Erythematous with Pancytopenia, Following a Covid-19 Infection

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Abstract

Background: Systemic lupus erythematosus (SLE) is an autoimmune disease characterized by various clinical manifestations and a wide profile of autoantibodies. The etiology of SLE is unknown, but it is considered a complex disease involving genetic, hormonal, immunologic, and environmental factors. Pancytopenia can occur in SLE, but it is less common than isolated cytopenias. COVID-19, caused by SARS-CoV-2, was first identified in 2019 as a respiratory disease. Several reports have linked prior or concurrent COVID-19 infections with an increased prevalence of autoimmune and autoinflammatory disorders.

Case report: We present a patient with a history of COVID-19 infection two months earlier, who developed high fever, abdominal pain, and petechiae. During hospitalization, the patient developed pancytopenia. A diagnosis of SLE was established based on clinical manifestations and positive immunological markers. The patient was treated with immunosuppressants according to SLE treatment protocols. We discuss the pancytopenia in SLE, the importance of timely diagnosis, and the potential role of COVID-19 as a trigger or exacerbator of SLE.

Conclusion: A timely diagnosis and appropriate therapy for pancytopenia are crucial in the course of SLE, especially considering the potential role of COVID-19 as a trigger or exacerbating factor.

Keywords: Systemic lupus erythematosus, pancytopenia, COVID-19

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INTRODUCTION

Systemic lupus erythematosus is an autoimmune disease characterized by a variety of clinical manifestations and a wide profile of autoantibodies (1). Hematological manifestations are common and form part of the classification criteria of the American College of Rheumatology (ACR) and Systemic Lupus International Collaborating Clinics (SLICC) (2,3).

Autoimmune hemolytic anemia, leucopenia and thrombocytopenia are included in both ACR and SLICC criteria. However, neither set of criteria specifies how leucopenia and lymphopenia in these patients can be differentiated from decreased white cell count caused by immunosuppressive therapy or other causes (4).

Pancytopenia is less common than isolated cytopenia, but it can occur in SLE. The most frequent findings in bone marrow aspirates include hypocellularity and bone marrow necrosis, which are attributed to the autoimmune mechanisms of the disease. Cytotoxic or myelosuppressive drugs are always a consideration in cases of pancytopenia (5).

COVID-19 is a disease caused by the SARS-CoV-2 virus, first identified in December 2019 in Wuhan, China. It is highly contagious and has spread rapidly across the world (6). Recently, Covid-19 infection is describe as a trigger for SLE (7). The relationship between viral infections and autoimmune disorders is complex and may trigger, exacerbate, or mimic SLE (8).

In this paper, we present the case of a patient who developed systemic lupus erythematosus with pancytopenia two month after a mild COVID-19 infection.

CASE REPORT:

An 11-year-old girl was admitted to the University Hospital Center “Mother Teresa” of Tirana, presenting with a 6-day history of high fever and abdominal pain, along with a one-day history of worsening rash on her shoulders and arms. Upon arrival, she appeared tired, but oriented and cooperative. She had a high temperature (38°C), a respiratory rate of 20 breaths/min, a heart rate of 115/min, blood pressure of 100/80mm Hg, and an oxygen saturation of 98 % on ambient air.

The initial examination revealed a pale child with petechiae on face, arms and shoulder (Figure 1), oral ulcers, and a distended, hyper-sensible abdomen. Bowel sounds were normal, the spleen was not palpable, and liver was palpable 1-2cm under costal arc. No other abnormalities were noted on physical examination.

The patient had been born preterm, at the 27th week of gestation, from a twin pregnancy. Her older sister was diagnosed with Crohn's Disease.

Laboratory examination revealed a red blood cell: 3.39 x106/uL, hemoglobin (Hb) level 9.8g/dl, hematocrit 31.9%, mean corpuscular volume 94.2fL, white blood cells 2500cells/mm3 (61.1% neutrophils, 30% lymphocytes, 8.02%, monocyte, 0.2% eosinophil and 0.1 %basophils).

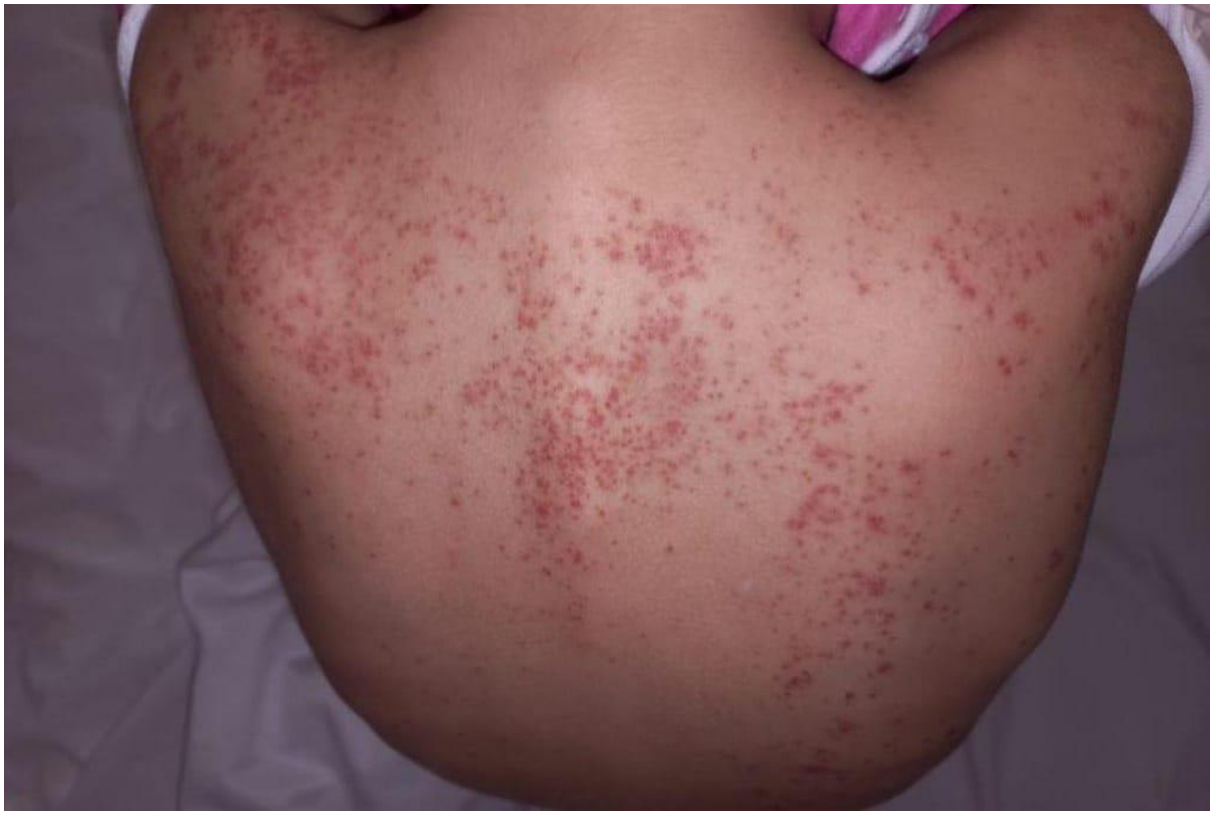

Figure 1. Petechiae on the shoulders

Platelet count was 149000cells/ mm3. Total bilirubin 0.25mg/dL, Alanine aminotransferase 37U/L, Aspartate aminotransferase 63U/L, C reactive protein 0.36mg/dL, Fibrinogen activity 361mg/dl. Reverse transcriptase PCR for COVID-19 was negative, IgG antibodies for COVID-19 were positive 26.83 (RR, >1 Positive). Serum ferritin level was 850ng/mL. Detailed laboratory results are shown in Table 1.

Tabelle 1. Laboratory results

Hospitalisation time	Day 1	Day 3	Day 5	Day 19	Day 24	Reference range
White blood cells, per mm3	**2500**	5100	**2300**	5800	9900	4500-10000
Absolute lymphocyte count, per mm3	700	900	500	1700	1700	
Absolute neutrophil count, per mm3	1500	3900	1800	3300	7200	
RBC x10^6/uL	**3.39**	**3.34**	**3.03**	**2.88**	3.14	4-5.3
Hemoglobine (g/dl)	**9.8**	**9.6**	**8.7**	**9.0**	9.3	11.5-12.5
Hematocrit %	**31.9**	**31.8**	**28.8**	26.9	30.3	33-34
Platelet per mm3	**149000**	**77000**	**138000**	244000	292000	150000-400000
CRP (mg/dL)	0.36	0.13				<0.5
LDH (U/L)			**238**	469	293	157-272
ALT (U/L)	**37**	**94**	**101**	127	113	9-25
AST (U/L)	**63**	**159**	**170**	184	54	18-36
D-dimer (ug/mL)		**1.68**	**2.53**			<0.5
Fibrinogen (mg/dl)	361					160-390
Ferritin (ng/ml)		**863.41**	**1509.40**			13.7 – 79.8
IgM SARS CoV-2	Negative					
IgG SARS CoV-2	Positive					
ANA			**1280**	1280		<160
Anti-dsDNA IU/mL			**577.4**	550.4		<100
Chromatin abs.			**>8.0**			<1.0
ENA			3.08			
MPO (RU/mL)			1.5			<20
PR3 (RU/mL)			1.82			<20
C3 mg/dL			**27**	**30**	**49**	82-173
C4 mg/dL			**<2.9**	**<2.9**	**5.1**	12-46

ALT = alanine transaminase, AST = aspartate aminotransferase, ANA = antinuclear antibody, Anti-dsDNA = Anti-double stranded DNA, ENA=Nuclear Antigen Antibodies, MPO=Myeloperoxidase, PR3=Proteinase 3 C3 = complement component 3, C4 = complement component 4, CRP = C-reactive protein, IgG = immunoglobulin G, IgM = immunoglobulin M, IU = international unit; LDH = lactate dehydrogenase, SARS-CoV-2 = severe acute respiratory syndrome coronavirus

Abdominal ultrasonography showed an enlarged liver and mesenteric lymph nodes. Chest radiography revealed bilateral peri bronchial thickening. Suspecting Pediatric Inflammatory Multisystem Syndrome (PIMS), she was treated with dexamethasone and ceftriaxone, alongside supportive hydration. Mild improvement was noted initially, but her condition deteriorated on the 6th day with high fever, persistent fatigue, and abdominal pain. She was completed with other laboratory test, febrile Antigens for Salmonella, Proteus and Brucella and Leishmaniosis antibodies, anti HCV, HAV Ig G and Ig M, were negative. Further tests revealed pancytopenia, increased transaminases, and elevated ferritin levels. Bone marrow biopsy showed no malignancy.

Strong suspicion for Systemic Lupus Erythematosus (SLE) led to tests showing positive ANA (1280, <160), Anti-dsDNA (550.4 IU/mL, <100), and chromatin abs. (>8, <1.0). The diagnosis was confirmed based on clinical (oral ulcers, pancytopenia) and immunologic (positive ANA, Anti-dsDNA, low C3 and C4) criteria. She was treated with high-dose intravenous methylprednisolone, followed by oral prednisone, resulted in rapid clinical improvement.

DISCUSSION

SLE is a systemic autoimmune disorder with a wide range of clinical manifestations, including pancytopenia. In this case, the diagnosis was confirmed by typical clinical features and specific autoantibodies. Pancytopenia in SLE can result from immune-mediated destruction of blood cells, bone marrow suppression due to disease activity, or side effects of medication (9). This case underscores the importance of considering SLE in the differential diagnosis of patients presenting with pancytopenia.

The association between COVID-19 and autoimmune disorders like SLE is a topic of ongoing research. A recent study highlighted the induction of autoimmune antibodies and B cell activation in COVID-19 patients, suggesting a potential link between COVID-19 and autoimmune diseases (10). However, the exact mechanism remains unclear.

Viral infections can trigger autoimmunity through molecular mimicry, epitope spreading, and bystander activation. The patient's history of COVID-19 infection may have contributed to the development or exacerbation of SLE. Further studies are needed to understand the role of SARS-CoV-2 in triggering autoimmune diseases.

CONCLUSION

Systemic lupus erythematous should be included in the differential diagnosis of any child with pancytopenia. Accurate diagnosis and appropriate therapy in cases with pancytopenia remain vital in the course of disease. There is an association between Covid-19 infection and autoimmune diseases, as some other viral infections, it can trigger, worsen or resemble

SLE. Further studies are required to understand the relationship between Covid-19 and autoimmune disorders.

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Conflict of Interest Statement: The author declares that have no conflict of interest.

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