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LETTER TO THE EDITOR

Case of fulminant type 1 diabetes mellitus associated with parvovirus B19 infection

A man aged in his 60′s was admitted to Kobe Rosai Hospital, Kobe, Japan, because of impaired consciousness. One week before admission, he manifested erythema on his trunk and extremities that was associated neither with fever nor with flulike symptoms. Thirst and nausea developed within a few days of erythema onset. Whereas the erythema disappeared spontaneously, the thirst and nausea worsened. A family member noticed abnormal behavior of the patient and took him to the emergency room of the hospital, where his consciousness was found to be impaired. He manifested ketonuria and metabolic acidosis with marked hyperglycemia, a slightly increased hemoglobin A1c content (National Glycohemoglobin Standardization Program value calculated from the Japan Diabetes Society value,[1]) and a low serum C-peptide level (Table 1). His hemoglobin A1c at an annual health check-up carried out 17 days previously was 5.5%. Serum levels of amylase and lipase were high, and liver and kidney function were slightly and severely attenuated, respectively. Computed tomography showed no morphological abnormalities of abdominal organs including the pancreas. The patient was immediately admitted to the hospital, and treated according to standard care for diabetic ketoacidosis by intravenous supplementation with electrolyte fluid and insulin. His consciousness returned to normal as the hyperglycemia and acidosis were ameliorated. On the day of admission, the serum titer of antibodies to glutamic acid decarboxylase was borderline high, but it had returned to a normal level on a second test carried out 2 weeks later. Tests for islet cell antibodies and antibodies to anti-insulinoma-associated protein-2 antibody were negative. Human Leukocyte antigen typing revealed the patient to harbor DRB1*09:01-DQB1*03:03 and DRB1*04:05-DQB1*04:01alleles, the latter of which confers susceptibility to fulminant type 1 diabetes mellitus[2]. The patient was diagnosed with fulminant type 1 diabetes mellitus and discharged 36 days after admission with multiple daily subcutaneous insulin injections.

Table 1 | Laboratory data on admission

Urinalysis	
pH	5.0
Occult blood	2+
Glucose	1000 mg/dL
Protein	50 mg/dLl
Ketone	2+
Complete blood count	
White blood cells	21500/μL
Red blood cells	390 × 10^4/μL
Hemoglobin	13.1 g/dL
Hematocrit	40.6%
Platelet	21 × 10^4/μL
Arterial blood gas	
pH	7.050
pO2	115.3 mmHg
pCO2	20.6 mmHg
HCO3-	3.7 mmol/L
Base excess	–26.3 mmol/L
Blood chemistry analysis	
Albumin	4.1 mg/dL
AST	44 IU/L
ALT	31 IU/L
T-Bil	0.39 mg/dL
Amylase	1155 IU/L
Lipase	1346 IU/L
ALP	189 IU/L
LDH	300 IU/L
CK	1724 IU/L
BUN	87.1 mg/dL
Cr	4.2 mg/dL
Na	114 mEq/L
K	7.8 mEq/L
Cl	74 mEq/L
Glucose	1462 mg/dL
HbA_{1c}	6.5%
CPR (C-peptide)	0.09 ng/mL

ALP, alkaline phosphatase; ALT, alanine aminotranferase; AST, aspartase aminotranferase; BUN, blood urea nitrogen; CK, creatine kinase; Cl, chlorine; CPR, C-peptide immunoreactivity; HbA_{1c}, hemoglobin A1c; K, potassium; LDH, lactate dehydrogenase; Na, sodium; T-Bil, total bilirubin.

We examined antibody titers for various viruses in serum obtained on the first and 21st days of hospitalization (Table S1). Among those examined, only immunoglobulin M class antibodies to parvovirus B19 changed substantially during the first 3 weeks of hospitalization, decreasing from 1.32 (normal range <0.8) to 0.96, suggestive of a recent infection with parvovirus B19. Given that erythema is a common clinical manifestation of parvovirus B19 infection[3], the skin rash experienced by the present patient 1 week before admission might have been caused by infection with the virus. It is of note that parvovirus B19 infection is known to trigger a variety of autoimmune disease-like conditions including systemic lupus erythematosus, rheumatoid arthritis and autoimmune cytopenia[3]. Similarity in amino acid sequence between parvovirus B19 proteins and human proteins thought to be related to such diseases has been implicated in the pathogenesis of autoimmune disorders triggered by this virus[3]. Although the pathophysiology of fulminant type 1 diabetes mellitus remains unclear, immunologic processes triggered by viral infection have been implicated[4]. Further accumulation of clinical evidence for the association of viral infection with fulminant type 1 diabetes mellitus together with basic studies of the mechanistic link between viral infection and β-cell destruction should provide further insight into the pathogenesis of this condition.

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SUPPORTING INFORMATION

Additional Supporting Information may be found in the online version of this article:

Table S1 | Viral serology.