

Lethal Triumvirate. A Case Report of COVID-19 and Rocky Mountain spotted fever in a Patient with Drug Dilated Cardiomyopathy

Gisel Viviana Licón- Martínez¹, Hiram Javier Jaramillo-Ramírez²

¹First year resident of internal medicine at the General Hospital of Mexicali

²Chairman, Internal Medicine Department at the General Hospital of Mexicali

ABSTRACT

Rocky mountain spotted fever is a systemic inflammatory disease that occurs from April through September, even do, it may occur during other months like this case. In addition, it is presented in a rare context with cardiomyopathy and COVID-19.

KEYWORDS: Rocky Mountain Spotted Fever, COVID-19, cardiomyopathy.

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INTRODUCTION

The pandemic declared by the World Health Organization (WHO) in March, 11, 2020 has affected in a great way all of the health systems worldwide. Perhaps, the rest of the diseases are still present and may even be confused with some symptoms. That is the reason why it is important to keep in mind other diseases that are endemic in our population such as rocky spotted mountain fever.

CASE REPORT

Twenty-four-year-old male user of methamphetamines and cannabis for the last four years, last dose was two weeks before he arrived at the hospital.

Asthma with unknown time of evolution and treatment, last exacerbation one week before his admission.

Current illness began one week ago with dysuria, macroscopic hematuria, abdominal pain in epigastrium of insidious onset, moderate to severe intensity with irradiation to both iliac fossae, nausea, vomiting of gastro alimentary content, asthenia, adynamic, hypoxemia.

On physical examination, basal bilateral crackles heard in the chest, soft abdomen, generalized tenderness to the palpation, predominantly in the epigastrium, positive McBurney and Giordano, arms and legs with puncture marks. The laboratory findings during admission are shown in Table 1.

Parameter	Result	Reference value
Hemoglobin (g/dL)	13.54	12.5 – 20.5
Hematocrit (%)	45.31	39 - 59
Platelets (10 ³ /μL)	194	150 - 450
White blood cells (10 ³ /μL)	7.8	5 - 10
Neutrophils (#10 ³ /μL)	5.5	1.9 . 8
Lymphocyte (#10 ³ /μL)	1.8	1 – 4.5
Glucose (mg/dL)	84	60 - 100
Creatinine (mg/dL)	1.11	0.72 – 1.25
Albumin (g/dL)	3.60	3.5 – 5.2
Total bilirubin (mg/dL)	2.10	0.2 – 1.2
Direct bilirubin (mg/dL)	1	0 – 0.5
AST (U/L)	863	5 - 34
ALT (U/L)	767	0 - 55
Alkaline phosphatase (U/L)	99	40 – 150

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GGT (U/L)	59	12 - 64
Amylase (U/L)	34	4 - 40
Sodium (mEq/L)	137	137 - 145
Potassium (mEq/L)	4.30	3.6 - 5
Chlorine (mEq/L)	102	98 - 107
Calcium (mEq/L)	8.10	8.4 - 10.2
TP (seg)	27.50	11.9
TTP (seg)	35.60	30.6
INR	2.80	0.8 - 1.2
Fibrinogen (mg/dL)	147.42	150 - 450
pH	7.19	7.35 - 7.45
pO ₂ (mmHg)	34	30 - 50
pCO ₂ (mmHg)	31	38 - 50
Bicarbonate (mEq/L)	11.90	23 - 27
HIV, CHV, BHV	No reactive	
IgG, IgM SARS-CoV-2	No reactive	

Abdominal ultrasound revealed diffuse thickening of the gallbladder wall, free fluid in the per hepatic, perisplenic, Morrison and splenorenal spaces, increased per portal echogenicity, bilateral pleural effusion and pericardial effusion. The simple CT scan showed pleural effusion, ascites, hepatomegaly, generalized gallbladder wall thickening and two intraventricular thrombi.

An echocardiogram was performed and revealed a left ventricle with global hypokinesia, severely dilated, severe mitral and tricuspid regurgitation, posterolateral intracavitary thrombus, severe dilation of the pulmonary trunk, positive bubble study for shunts. Right ventricle with TAPSE 10 mm, severely dilated with severe global hypokinesia, pericardial effusion, LVEF 12%.

The clinical course was torpid with rapid deterioration in less than 24 hours. On suspicion of Rocky Mountain spotted fever, doxycycline and azithromycin were started empirically. RT-PCR was collected positive for SARS-CoV-2. He presented hemodynamic instability that evolved to cardiac arrest that does not respond to advanced cardiovascular resuscitation maneuvers and he was declared dead with the diagnosis of cardiogenic and septic shock, heart failure, SARS-CoV-2 pneumoniae, acute liver failure, acute kidney injury, disseminated intravascular coagulation, and multiple organ failure. Immunofluorescence was reported positive 1:256 for *R. rickettsia* post mortem.

DISCUSSION

Rocky Mountain spotted fever, also known as "the great imitator" was first described in Montana, United States of America in 1873. It was until the 20th century when the microorganism was identified by Wilson and Ricketts for whom it was named.^{1,2}

It is caused by the bacteria named *Rickettsia rickettsia* a Gram negative, intracellular obligate coccobacillus that lodges in endothelial cells to metabolize glucose and other energy substrates.^{1,2} It belongs to the Rickettsiaceae family.² The route of transmission is through the bite of an arthropod or its feces.¹ Different vectors such as *Dermacentor variabilis* (dog tick) have been identified in the United States of America, *Dermacentor andersonii* (wood tick) in the Mississippi River region and *Rhipicephalus sanguineus* (dog tick) in the outbreak in Arizona and Mexico between 2002 and 2014.^{1,2} The incidence is higher in men than women and the risk increase when doing outdoor activities during spring and summer, especially in green areas.²

The incubation period ranges from 2 - 14 days with an average of 4 days with nonspecific symptoms such as general malaise, fever, myalgia, headache, nausea, vomiting and abdominal pain.² Other less common symptoms are photophobia, neck pain, diarrhea and alteration of consciousness.² These symptoms may last for 2 - 3 days before the appearance of a maculopapular rash that begins in the extremities and continues with a centripetal distribution, in 50% of the cases it turns into a petechiae or purpuric rash.² In severe cases it may also affect palms, soles, mucosae, and even progress to necrosis or gangrene.² The absence of the rash should not exclude the diagnosis.² As a result of endothelial cell infection and damage to the hemostatic system, this leads to increased vascular permeability, edema, hypovolemia, hypotension, acute kidney injury, pulmonary edema, acute respiratory distress syndrome, gastrointestinal bleeding, disseminated intravascular coagulation, deep vein thrombosis, aseptic meningitis, cerebral infarction, shock, multiple organ failure.^{3,4} Other findings on physical examination are conjunctivitis, lymphadenopathy, peripheral or periorbital edema, hepatosplenomegaly, jaundice.²

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Differential diagnosis should be made with rubella, gastroenteritis, meningococemia, upper respiratory infection, thrombocytopenic purpura, adverse drug reaction, infectious mononucleosis.^{2,3}

Laboratory findings are nonspecific and show normal, low or high leukocytes, thrombocytopenia, hyponatremia, elevated liver enzymes.³ The history of exposure to a tick with symptoms similar to those mentioned should lead to suspicion of rocky mountain spotted fever, however, the absence of evidence of a bite or tick exposure should not exclude the diagnosis.² The classic triad includes fever, rash and a history of a tick bite, however, this triad occurs in only 50% of cases.² An alternative triad is fever, rash and headache that only occurs in 50% of the cases.² The laboratory diagnosis is made with a positive serological test for anti-rickettsia antibodies through immunofluorescence (IFA) greater than 1:64, complement fixation greater than 1:16, latex agglutination greater than 1:28 or positive ELISA in the context of a suspected case.² Seroconversion occurs on day fourteen of the disease.⁴ Blood nucleic acid analysis is less sensitive than IFA serological studies.² A suspected case with IFA results greater than 1:64 is sufficient to make the diagnosis.⁴

The earlier the treatment is initiated, the better outcomes the patient would have and prevent severe illness or even death.⁵ The drug of choice is doxycycline oral or intravenous, 100 mg twice a day and should be maintained for at least 3 days after fever defervescence which gives a total of 5 to 7 days of treatment with antibiotics. The only alternative available for pregnant women is chloramphenicol.²

Poor prognosis factors and increased rates of mortality include history of alcoholism, advanced age, deficiency of glucose-6-phosphate-dehydrogenase.⁴ A study conducted by one of the authors with a total of 129 patients showed that being over 20 years of age, distal necrosis in extremities and acute kidney injury are the main risk factors of death.⁶ No major incidence by gender was observed.⁶

On the other side, we have the acute respiratory syndrome coronavirus 2 (SARS-CoV-2), an RNA virus that triggered a pandemic declared in March 2020 after the first cases occurred in December 2019 in Wuhan, China.⁷ The clinical presentation varies from a mild to severe disease with cough, fever, dyspnea, fatigue, headache, ageusia, dysgeusia and different tomographic findings.⁸ The typical tomographic findings include a stone pattern opacity, consolidation, reticular pattern, ground glass and pleural thickening.⁹ The previous or new existence of heart failure in the context of SARS-CoV-2 can complicate the presentation, management and prognosis.¹⁰ The mortality reported by COVID-19 is 6.9% which rises up to 10% in those with heart failure.¹⁰ These patients have a higher risk of dying due to their weak immune system and poor

hemodynamic function.¹⁰ The inflammatory reaction is increased by a greater production of tumor necrotic factors and a lower production of IL-10.¹⁰ Diagnosis is made by real time polymerase chain reaction (RT-PCR) with a nasopharyngeal swab sample, detection of IgG and IgM antibodies, imaging studies such as CT chest scan.¹¹

Finally, drug induced dilated cardiomyopathy is an entity that has been increasing in recent years.¹² The main mechanism associated with this disease is an increase in the release and reduction of catecholamine reuptake, which exerts negative cardiovascular effects such as chest pain, hypertension, arrhythmias, acute myocardial infarction, palpitations, dilated cardiomyopathy and sudden cardiac death.¹² This is because it stimulates alpha- and beta-adrenergic receptors.¹² Up to 5% of the visits to the emergency room for acute heart failure are due to methamphetamine use.

CONCLUSION

Since the arrival of the pandemic originated in Wuhan, China, all the attention has been focused on its presentation and evolution, even though the rest of diseases continue. In our community, the outbreak of cases associated with the pandemic has been important with 20,961 confirmed cases and 3,301 confirmed deaths by July, 23, 2021.¹³

This case shows the importance of considering the various possibilities of presenting more than one disease in a single patient associated with the risk factors. Likewise, the use of illicit drugs generates the risk of multiple diseases, in this case dilated cardiomyopathy.

In a city like ours, the high incidence of other diseases with a high mortality rate such as rocky mountain spotted fever with the outbreaks that have already occurred should not be ignored.

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