

Novel coronavirus (MERS-CoV) in Saudi Arabia, Qassim Region

A Case Report

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Abstract

As of May 2014, over 530 cases of human infection with the Middle East Respiratory Syndrome Coronavirus (MERS-CoV) have been reported. We describe the first case of MERS-CoV in the Qassim region of Saudi Arabia, a 69-year-old man who rapidly developed severe acute respiratory distress syndrome (ARDS) and expired on hospital day nine. MERS-CoV was confirmed by DNA testing postmortem. Novel coronavirus infection should be suspected in high-risk patients living in or visiting geographical regions where other cases have been reported.

Introduction

In September 2012, a novel strain of coronavirus was isolated from a patient in Jordan with acute respiratory illness and became known as the novel human coronavirus (nCoV). As of May 2014, over 530 cases of human infection with nCoV (now called Middle East Respiratory Syndrome Coronavirus or MERS-CoV) have been reported to the Centers for Disease Control and Prevention and World Health Organization (WHO).⁸⁻⁹

Case Report

A 69-year old male with past medical history of heavy smoking, chronic obstructive pulmonary disease (COPD) and type II diabetes mellitus presented to the hospital in February 2013 with cough and fever over the course of five days. Upon presentation, the patient was alert, with a temperature of 39°C, pulse rate of 83 beats/min, respiratory rate of 38 breaths/min, and a blood pressure of 140/60 mm Hg. Physical examination was notable for diminished breath sounds over both lung fields and infrascapular crepitation. An arterial blood gas (ABG) obtained while the patient was breathing on room air revealed a pH of 7.46, PaO₂ of 52 mm Hg, PaCO₂ of 26 mmHg and an HCO₃ of 21 mEq/L. Serum electrolytes were unremarkable except for an elevated serum glucose level of 235 mg/dl. Chest radiograph showed hyperinflated lungs with bilateral lower zone infiltrates.

The patient was started on oseltamivir 150 mg po BID, ciprofloxacin 400 mg IV BID, piperacillin/tazobactam 4.5 g IV TID and budesonide nebulized 500 mcg TID. Ten liters of oxygen per minute through a face mask with a reservoir resulted in the patient achieving an oxygen saturation of 90%. On day 3, the patient developed diffuse pulmonary infiltrates (Fig. 1), and his respiratory condition continued to deteriorate requiring endotracheal intubation and mechanical ventilation. Positive end expiratory pressure (PEEP) of 10 cm H₂O was added and IV methylprednisolone infusion was started at 300 mg/day.

On hospital day 7, the patient's oxygen saturation fluctuated between 60% and 70% on the airway pressure release mode of mechanical ventilation (APRV), with a FiO₂ of 1.0 and prone positioning. He developed progressive decline in hemoglobin, elevated transaminases and worsening renal failure. On hospital day 8, antibiotics were changed to imipenem 500 mg IV TID and colistin 2 million units IV daily in response to the clinical deterioration. A heparin infusion was also provided as empiric treatment for pulmonary embolism, because of refractory hypoxemia with an echocardiogram that revealed a dilated right ventricle. The patient continued to deteriorate and expired on hospital day 9.

Postmortem laboratory testing (real-time reverse-transcriptase-polymerase chain-reaction or RT-PCR) of nasopharyngeal specimens performed at the Ministry of Health Central Laboratory in Riyadh confirmed infection with MERS-CoV.

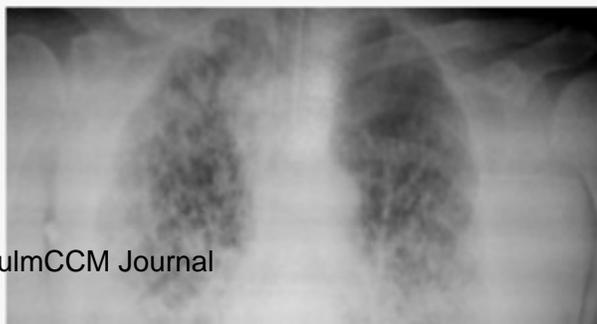


Fig. 1: Chest radiograph, hospital day 3

The patient developed rapidly progressive diffuse opacities, worse at the lung bases, consistent with acute respiratory distress syndrome (ARDS).

Discussion

Coronaviruses are enveloped positive-stranded RNA viruses that are associated mainly with respiratory and enteric infections¹ Coronaviruses are among the more than 200 viruses that are responsible for the common cold. Other diseases caused by coronaviruses include hepatitis, neurologic infections, infectious peritonitis, nephritis, and pancreatitis.

Coronaviruses became newsworthy in 2003 when the novel virus called Severe Acute Respiratory Syndrome (SARS)-CoV caused a global pandemic, spreading to more than 37 countries around the world. Between 2002 and 2003, SARS affected over 8,000 people and was responsible for 774 reported deaths² Although there was no effective treatment found for SARS, the epidemic appears to have been terminated by infection control efforts, since no new cases have been reported since 2004.

The novel MERS-CoV shares a genus with SARS-CoV, but the nCoV disrupts a far greater number of human genes than the SARS coronavirus.³ MERS-CoV may down-regulate the activity of genes involved in immune signaling, delaying the immune response to infection.³ The current 60% mortality rate attributed to MERS-nCoV is much higher than the 9.5% mortality rate during the 2002/2003 SARS pandemic.²

Complete genome sequencing revealed that MERS-CoV is related to two beta coronaviruses (HKU4 and HKU5) with a reservoir in Asian bats.⁵ MERS-CoV is the first coronavirus of its type (lineage C ? coronavirus) known to infect humans⁶ While human-to-human transmission is assumed to be less likely compared to SARS-CoV, there is cause for concern: three of the cases in Saudi Arabia were within one family, and several healthcare workers who cared for two of the cases in Jordan developed similar symptoms to patients infected by MERS-CoV. Recent cases in the United Kingdom of family members who had not travelled to the Middle East raise concern that person-to-person transmission can occur in settings where frequent close contact is likely (e.g, households).

In May 2014, two cases of MERS-CoV in the U.S. were recorded, both in travelers who had recently arrived from Saudia Arabia. The cases, one in Indiana and one in Florida, were unlinked, and no further transmission is believed to have occurred^{9,10}

Conclusion

We report the first confirmed case of MERS-CoV in the Qassim region of Saudi Arabia. Our patient presented with fever, respiratory distress and progressive pulmonary infiltrates resulting in severe ARDS and subsequent death. Clinicians should consider nCoV infection in any patient with respiratory symptoms and recent travel to affected areas in the Middle East.

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