

Fatal respiratory syncytial virus infection in immunocompetent adult: A case report

Abstract

Background: Respiratory syncytial virus (RSV) is the most common pathogen that causes acute lower respiratory tract infection in infants and young children. However, very rarely, RSV can induce acute respiratory distress syndrome (ARDS) in immunocompetent adults. Unluckily, optimal management has not been well-known for this eventually fatal condition. We report a case of fatal RSV-induced ARDS occurring in a previously healthy man.

Observation: A 42-year-old male was admitted to the Emergency Department with cough, dyspnea and fever. His previous clinical history showed no relevant disease. Pulmonary radiology revealed diffuse ground-glass opacities in both lung fields. Lab analysis revealed high inflammation markers, witness of infection. After 2 days, the patient developed ARDS, we transferred it in the Intensive Care Unit. Microbiological investigation reported positivity of RSV PCR. Furthermore, the patient had a negative serology for HIV and normal T CD4+ lymphocyte counts. Despite treatment with Ribavirin and respiratory support, the patient died of pulmonary embolism.

Conclusion: Thus, RSV infection should be considered a possible though rare cause of ARDS in adulthood in particular when computed tomography (CT) chest find diffuse ground-glass opacities.

Keywords: acute respiratory distress syndrome, immunocompetent adult, PCR, respiratory syncytial virus

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Abbreviations: RSV, Respiratory syncytial virus; ARDS, acute respiratory distress syndrome

Introduction

Human respiratory syncytial virus (RSV) is an enveloped particle which belongs to the genus *Pneumovirus* in the *Paramyxoviridae* family. RSV can cause severe illness in young children.^{1,2} However, RSV is responsible for self-limiting infection (except in immunocompromised patients).^{1,3} This article report a case of ARDS associated with RSV infection in an immunocompetent adult.

Case presentation

A previously-healthy 42-year-old man, a military worker, was admitted to the Emergency Department for was admitted to the Emergency Department with cough, dyspnea and fever. The patient has never been a smoker, was never followed for a medical condition. The initial assessment revealed the presence of respiratory rales in both lung fields without abnormal sign on heart auscultation. Patient had severe hypoxemia (SaO₂, 86%). His body temperature was 39.0°C. A chest X-ray revealed diffuse haziness dominant in his right lung field. Chest computed tomography revealed ground glass opacity. Lab examination revealed elevated white blood cell (WBC) count (20 320/mm³) with 97% neutrophils, and high C-reactive protein (CRP) rate (45mg/l).

Moreover, patient had an acute renal failure with serum creatinine at 357μMol/l. The diagnosis of ARDS was retained. We transferred the patient to the Intensive Care Unit at day 2. After taking samples

for laboratory investigations, and because patient's condition became worse (hypoxemia), the patient was intensively treated, endotracheal intubation with mechanical ventilation support, antibiotics (Imipenem, moxifloxacin, and cotrimoxazole), corticosteroids (methylprednisolone).

At day 4 after hospitalization, the lab results reported leukocyte count of 39000/mm³, with 95% neutrophils, platelet count at 111 000/mm³, CRP rate at 263mg/l and procalcitonin rate at 1.89ng/ml. Others inflammation markers (ferritin, Lactate Dehydrogenase) were also high. No positive result was reported for tuberculosis Xpert testing, bronchoalveolar lavage (BAL) and blood cultures. Serologic tests for *Mycoplasma* and *Chlamydiae* were negative. Antigen for legionellosis in urine and chimiluminescent Microparticules Immuno Assay (CMIA) for IgM specific for cytomegalovirus and Epstein Barr virus in serum were negative. The 4th generation HIV testing in serum by CMIA was also negative as well as auto-immunity testing (anti-nuclear antibody, anti-DNA antibody, anti-SSA and SSB antibody, anti-SCL70 antibody, anti-MPO antibody, anti-PR3 antibody, anti-SM antibody, anti-cardiolipid antibody). In the absence of improvement of the patient's state of health, viral research in respiratory sample was launched at day 5. Real-time reverse transcriptase polymerase chain reaction (RT-PCR) was realized using Xpert Flu/RSV XC (Cepheid©) from nasopharyngeal sample. Result was positive for human RSV. T CD4+ cell count was at 577/mm³. Thus, the patient received ribavirin by gastric tube, 400mg every 12 hours (ribavirin inhalation solution was unavailable) with methylprednisolone 30mg every 24 hours. At day 10, there was a notable improvement in all the clinical and biological signs. The intubation was maintained.

Fifteen days after his admission, the patient developed fever, dyspnea and tachycardia. Chest Rx showed enlarged pulmonary artery and pleural effusion. D-Dimers was high (1,4mg/l). Diagnosis of pulmonary embolism was confirmed by angio scanner. Patient dies the next day despite of the initiation of anticoagulant treatment.

Discussion

RSV is a non segmented negative single stranded RNA virus, belonging to the genus *Pneumovirus* in the *Paramyxoviridae* family. Because it is an enveloped virus, he transmits through respiratory droplets. The indirect transmission of the virus through the hands, dust and clothing of health care workers is also important.⁴ The frequency of RSV infection in hospitalized child is 18.4% in Malaysia, 21.6% in Tunisia and 28% in Brazil. In Morocco, during September 2014 to April 2016 period, 18.4% specimens were tested positive for RSV, 45% of RSV infection was in children aged 0-6 months, higher positivity rate was observed between December and March.⁵

After contamination, RSV is multiplied in the epiglottis of the nasopharynx and then dispersed in the epithelium of the small airways and bronchiole.⁶ The duration of contagiousness depends on the age of the patient: for 3 weeks in young children (<6 months), 3 to 7 days in adults, up to several months in immunocompromised patients. The duration of the disease is 2 to 8 days in general.⁴ RSV is responsible of bronchiolitis in young children. Also, RSV-induced severe pneumonia or ARDS in immunocompromised patients is not uncommon. However, only some cases of RSV induced-ARDS in immunocompetent adult have been reported.^{7,8} RSV infection in adults is often asymptomatic. RSV infects 3 to 10% of adults annually⁹ and two thirds of RSV infected patients was complicated with pneumonia, the mortality rate was as high as 15 to 20% comparable to that of seasonal influenza in particular in elderly and immunocompromised patients.¹⁰ For us, the patient doesn't have any medical history.

Some studies showed that RSV induces recruitment of neutrophils, monocytes, memory T-cells and eosinophils and secretion of cytokines by respiratory epithelium. This immunological reaction increased vascular permeability and pulmonary edema, and producing the lesion of the airway.²

Otherwise, non-pulmonary manifestations of severe RSV infections have been reported: cardiovascular (myocarditis, pericardial effusion), central nervous system (convulsions, lethargy, and encephalopathy) and liver (acute hepatitis).⁶

Diagnosis of RSV respiratory infection is not easy based only on the clinical and non specific tests. Laboratory testing is essential for case confirmation in particular in complicated forms for these reason, genome detection by RT-PCR remains choice method for diagnosis of RSV infection.³ The type and quality of sampling determines the effectiveness of detection techniques for this virus. Samples should be taken very early in the infection and contain sufficient epithelial cells. RSV is sought at the respiratory epithelium, nasal (entry of viruses) or tracheobronchial epithelium. Throat swabs are inappropriate because these viruses do not replicate in the pharynx. The sampling is often done in children, by nasopharyngeal swabbing or nasal aspiration, but in adult, only nasopharyngeal swab is accepted. The transport of swabs imposes specific medium for minimizing the risks of spontaneous degradation of virus.⁴ In our case, we used Xpert Flu/RSV PCR wich had revealed high sensitivity and specificity for RSV diagnosis, 97,9% and 100% respectively.¹¹ This easy point of care testing (POCT) achieves rapid results (30 minutes) and improves patient

management. In many studies, POCT allowed many advantages: the decline of antibiotic use duration, length of in-patient stay, number of chest radiographs and duration of isolation of patients.¹¹ In our case, viral infections was suspected at day 5 after abnormally rapid deterioration of our patient. This has been delayed in the diagnosis and management of this infection.

Ribavirin is the only option approved for the treatment of RSV in newborns and small children hospitalized for severe RSV infection.¹¹ There are no treatment guidelines for RSV-induced ARDS in adult. In a few publications, inhaled ribavirin has been proposed.³ For us, regrettably, aerosolized ribavirin wasn't available. As an alternative, orally administered ribavirin have been suggested.^{12,13} Thus, we treated our patient with orally administered ribavirin and systemic corticosteroids. Despite the clinical and biological improvement, the patient was died of pulmonary embolism which is probably an ARDS complication.

Conclusion

RSV-induced ARDS is very uncommon but can be lethal in immunocompetent patients. In light of recent advances in the rapid diagnosis, this virus should be considered in adult with pneumonia regardless of their age and immunologic status, especially in the presence of CT chest findings of diffuse ground-glass opacities of the lungs. The present case highlights the significance of early clinical suspicion and active use of real-time RT-PCR test. Awaiting the development of an effective vaccine, studies are considered necessary to define optimal management of infections in immunocompetent adults.

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None.

Conflicts of Interest

All authors declare their no conflicts of interest for the publication of this article.

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References

1. Wang Q, Li W, Qu D, et al. Fatal pulmonary infection with respiratory syncytial virus in an immunocompromised adult patient A case report. *Medicine*. 2018;97:29.
2. Nair H, Nokes DJ, Gessner BD. Global burden of acute lower respiratory infections due to respiratory syncytial virus in young children: a systematic review and meta-analysis. *Lancet*. 2010;375(9725):1545–1555.
3. Luo YH, Huang CY, Yang KY, et al. Inhaled Ribavirin Therapy in Adult Respiratory Syncytial Virus-Induced Acute Respiratory Distress Syndrome. *Arch Bronconeumol*. 2011;47:315–317.
4. Freymuth F. Virus respiratoire syncytial, métagneumovirus et virus para-influenza humains. I. Propriétés des virus, multiplication, épidémiologie. *EMC (Elsevier SAS, Paris), Maladies infectieuses*. 2004.
5. Bimouhen A, El Falaki F, Iahzmad H, et al. Circulation of Respiratory Syncytial Virus in Morocco during 2014–2016: Findings from a sentinel-based virological surveillance system for influenza. *East Mediterr Health J*. 2016;22(7):483–490.

6. Gkentzi D, Dimitriou G, Karatza A. Non-pulmonary manifestations of respiratory syncytial virus infection. *J Thorac Dis.* 2018;10(Suppl 33):S3815–S3818.
7. Ann R, Falsey MD. Respiratory syncytial virus infection in adults. *Semin Respir Crit Care Med.* 2007;28(2):171–81.
8. Murata Y. Respiratory syncytial virus infection in adults. *Curr Opin Pulm Med.* 2008;14(3):235–240.
9. Michael H, Zaroukian. Case report: respiratory syncytial virus infection: a cause of respiratory distress syndrome and pneumonia in adults. *Am J Med Sci.* 1988;295:218–222.
10. Krilov LR. Follow-up of children with respiratory syncytial virus bronchiolitis in 1986 and 1987: potential effect of ribavirin on long-term pulmonary function. *Pediatr Infect Dis J.* 1997;16(3):273–276.
11. Griffiths C, Drews SJ, Marchant DJ. Respiratory syncytial virus: infection, detection, and new options for prevention and treatment. *Clin Microbiol Rev.* 2014;30:277–319.
12. Mori T, Nakamura Y, Kato J. Oral ribavirin therapy for lower respiratory tract infection of respiratory syncytial virus complicating bronchiolitis obliterans after allogeneic hematopoietic stem cell transplantation. *Int J Hematol.* 2011;93:132–134.
13. Shima T, Yoshimoto G, Nonami A, et al. Successful treatment of parainfluenza virus 3 pneumonia with oral ribavirin and methylprednisolone in a bone marrow transplant recipient. *Int J Hematol.* 2008;88(3):336–340.