

Respiratory Syncytial Virus-Associated Rhabdomyolysis and Sensorineural Hearing Loss in a Healthy Adult: A Case Report

ABSTRACT

Aims : This article aimed to demonstrate rare extra-pulmonary complications resulted from the respiratory syncytial virus infection (RSV) in healthy adult. We also performed a literature review about the treatment experience from these complications.

Presentation of Case : We examined a 33-year-old healthy Thai man, who initially had RSV pharyngitis that was later developed into rhabdomyolysis and sensorineural hearing loss. The complications recovered without permanent organ damage after treatment with intravenous fluid and prednisolone.

Discussion : Rhabdomyolysis and sensorineural hearing loss are considerably rare complications from RSV infection. According to the literature review and experience from our case, patients with extra-pulmonary complications have relatively good prognosis. Most patients were treated by intravenous fluid and corticosteroid in some case.

Conclusion : Although RSV-associated rhabdomyolysis and sensorineural hearing loss are rare, supportive treatment without RSV-specific antiviral drug is sufficient to treat these complications.

Keywords

Respiratory syncytial virus, rhabdomyolysis, myositis, sensorineural hearing loss, labyrinthitis

1. INTRODUCTION

Respiratory syncytial virus (RSV) is an enveloped RNA virus that has a single serotype with two subtypes: A and B [1]. Generally, RSV infection is common in all ages with good prognosis, except in young children and adults with concomitant cardiopulmonary diseases, as well as immunocompromised individual and elderly in nursing home –of whom are at high risk to develop severe lower respiratory tract infection and extra-pulmonary complications [2, 3]. This case report examines a healthy adult, who had a combination of rare complications resulting from the RSV infection.

2. PRESENTATION OF CASE

The patient was a 33-year-old healthy Thai man, who was hospitalized in September 2016. He was a staff at the governor's office, which is located in the urban district of Bangkok. Five days prior to admission, the patient experienced a high-grade fever without chills, malaise, sore throat, nonproductive cough, runny nose, and generalized muscle aches. He took amoxicillin (two grams per day), bromhexine, and acetaminophen –all of which were bought from a drug store. Three days later, he developed a mild spinning sensation when in an upright position. Other symptoms, such as fever, were resolved except for the muscle pain that was getting worse. Accordingly, he visited Vichaiyut hospital, Bangkok, Thailand, and was admitted for a symptomatic treatment.

On the day of admission, his vital signs were normal. Injected posterior oropharynx and watery rhinorrhea were noted. Other findings on physical examination were otherwise normal. Initial laboratory results include: WBC count $9,300 \times 10^6$ cells/L (39% neutrophils, 53% lymphocytes),

45 hemoglobin 12.8 g/dL, platelet count 265,000/uL, serum creatinine (SCr) 0.99 mg/dL, electrolytes
46 were within the normal range, aspartate aminotransferase 131 U/L, and alanine aminotransferase 58
47 U/L. Findings from the chest radiography were unremarkable. Nasopharyngeal swab for respiratory
48 virus group real-time PCR was conducted. RSV type B and *Streptococcus pneumoniae* were
49 detected. (The assay can detect influenza virus, parainfluenza virus, human rhinovirus, human
50 enterovirus, coronavirus, human metapneumovirus, human bocavirus, adenovirus, *Chlamydia*
51 *pneumoniae*, *Mycoplasma pneumoniae*, *Legionella pneumoniae*, *Bordetella pertussis*, *Bordetella*
52 *parapertussis* and *Haemophilus influenza*.) As a result, the patient was prescribed with
53 acetaminophen and N-acetylcysteine.

54 On the second day at the hospital, the patient still suffered from severe myalgia and
55 occasional dizziness when in an upright position. Meanwhile, his vital signs and physical examination
56 were normal. A CBC indicated WBC count of $6,300 \times 10^6$ cells/L (45% neutrophils, 45% lymphocytes).
57 The serum creatine phosphokinase (CPK) level was investigated and the result showed a markedly
58 elevated CPK level at 7,145 U/L. Serum creatinine level was 0.83 mg/dL and thyroid function test was
59 normal. Likewise, urinary dipstick test and microscopic examination were normal. On the next day, his
60 symptoms of myalgia and dizziness were slightly improved. However, the patient further developed
61 partial hearing impairment in the left ear. Physical examinations were compatible with sensorineural
62 hearing loss in the left ear without other neurological or otological deficits. An audiogram confirmed
63 that he had sensorineural hearing loss at a low frequency (250 and 500 Hertz). Magnetic resonance
64 imaging of brain was scheduled but the patient denied to consent because of a financial problem. A
65 diagnosis of RSV-associated rhabdomyolysis and SNHL were concluded from his clinical and
66 laboratory findings and also by the exclusion of other possible causes. The patient received an
67 aggressive intravenous hydration with normal saline in order to promote urine flow for the
68 management of rhabdomyolysis and was also prescribed with prednisolone 0.5 mg/kg/day for seven
69 days, as well as an anti-dizziness drug for the treatment of SNHL.

70 The patient did not develop renal failure. He had a normal SCr level and a good urine output.
71 His CPK level decreased exponentially from 7,185 to 628 U/L within four days. His hearing problem
72 was gradually recovered and he was allowed to go home after five days of admission.

73 3. DISCUSSION

74 RSV infection in healthy adults is usually limited to the upper respiratory tract. Lower
75 respiratory tract infection is uncommon, whereas extra-pulmonary complication is extremely rare.
76 Several studies found that patients with RSV subtype A infection were at higher risk of developing a
77 severe disease and resulting in poorer outcomes. An in vitro study revealed that RSV subtype A has
78 more potential to induce nuclear-factor κ B (NF- κ B) activation and produce pro-inflammatory cytokines
79 [1]. In contrast to the majority of literatures, we demonstrated an uncommon adverse clinical course
80 resulting from RSV subtype B infection in a healthy adult.

81 Viral infection is relatively an uncommon cause of rhabdomyolysis in adults. The reported
82 interval between the onset of diffused muscle pain and the rising of CPK level varied from the
83 concurrent time of the viral prodromal symptoms up to three weeks. The proposed mechanisms of
84 myositis are direct muscle invasion, viral-mediated myotoxic cytokines, and viral-induced autoimmune
85 myositis. The most frequent reported viruses are Influenza A and B. In addition, other viruses that
86 were described in various case reports include: Enterovirus, HIV, HTLV type 1, HBV, HCV,
87 adenovirus, parainfluenza, dengue virus, coxsackievirus, EBV, HSV, VZV, CMV, Echovirus, West Nile
88 virus, paramyxovirus, and parvovirus B19 [4-6]. RSV is among the rare virus that can cause
89 rhabdomyolysis. Available articles reported that such condition occurs only in children and elderly
90 patients [7-10]. Therefore, our patient is considered to be the first case of RSV-associated
91 rhabdomyolysis in a healthy adult. Although the severity of myositis in each reported case varied from
92 myalgia all the way to generalized muscle weakness, none of them developed a renal complication.
93 Recurrent rhabdomyolysis was reported in one child [10].

Most cases with acquired sensorineural hearing loss (SNHL) are idiopathic, meanwhile the prevalence of identifiable causes varied among literatures from 7 to 45%. Infection, especially viral, is the most common with approximately 13% of prevalence [11]. Viruses can cause SNHL by two mechanisms: (1) direct invasion to or reactivation of the latent virus in the labyrinthine organ, which further leads to cochleitis and neuritis; and (2) indirect inner ear tissue damage by the induction of the host-immune response to the viral antigen. The reported viruses that are associated with SNHL include: influenza, measles, mumps, rubella, adenovirus, arenavirus, CMV, EBV, HSV, VZV, HIV, HHV type 6, 7, 8, and West Nile virus [12, 13]. To the best of our knowledge, RSV-associated SNHL has never been reported by any publications. The severity of viral SNHL ranges from unilateral or bilateral mild hearing impairment to profound hearing loss. Patients may have a varying degree of dizziness, from a disturbing symptom to severe vertigo. Typically, viral SNHL is self-limited. The majority of patients completely recovered from the condition, except for some cases in which the patients who were infected by measles, mumps or rubella further developed a permanent hearing loss [13, 14].

Supportive is the main treatment of RSV infection. Anti-RSV agents, such as ribavirin and monoclonal antibodies –intravenous immunoglobulin (IVIg) and Palivizumab –are approved to be used for lower respiratory tract infection exclusively in infants, young children, and immunocompromised patients. The benefit of the use of steroids is still inconclusive. New anti-RSV agents, for instance, new generation of monoclonal antibody and small molecules, have been discovered but are still in the process of a clinical validation [15, 16].

Ertugrul *et al.*[10] reported a child who had a recurrent RSV-associated rhabdomyolysis. Prednisolone and IVIg were prescribed at the initial hospitalization due to the severity of the disease, while intravenous fluid was given on three following episodes. The results showed no significant difference in the recovery rate. Other available literatures on RSV and rhabdomyolysis did not describe their management. For the management of viral-associated SNHL, most cases were self-recovery, while some articles demonstrated good results from steroids administration. Nonetheless, the benefit was still not clear according to Cochrane review [17].

Due to the lack of evidence regarding the management of extra-pulmonary complications from RSV infection in our patient, we extrapolated the information from other viral-associated rhabdomyolysis and SNHL. Muscle lysis in our case stopped spontaneously without antiviral drug treatment. Intravenous fluid hydration was adequate to prevent the renal failure. Hearing was gradually improved since the second day after the patient was prescribed with prednisolone. However, the hearing improvement was considerably early, so we could not make a conclusion as to whether his clinical improvement was self-recovery or due to the use of steroid.

Despite the fact that our patient is the first case of RSV-associated rhabdomyolysis and SNHL, the actual incidence might be more common. Children and elderly patients are at high risk of developing a severe RSV infection. However, many of them are unable to communicate or report their symptoms, such as muscle pain or hearing loss, to their respective attending doctors. As a consequence, the incidence of complications resulting from RSV infection could be under-detected.

4. CONCLUSION

We reported a rare case of a healthy adult, who had a preceding concurrent RSV pharyngitis and rhabdomyolysis that was later followed by a unilateral sensorineural hearing loss. Supportive treatment without RSV-specific antiviral drug was sufficient to treat these complications. The benefit of prednisolone use was uncertain. The patient's clinical symptoms improved without permanent organ damage.

140 CONSENTS

141 All authors declared that written informed consent was obtained from the patient for
142 publication of this case report. A copy of the written consent is available for review by the Editorial
143 office/Chief editor/Editorial board members of this journal.

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