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CASE REPORT

Fatal acute respiratory infection in two young adults due to coronavirus HKU1 and rhinovirus/enterovirus in an area of the Colombian Caribbean

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Abstract

Acute respiratory infections caused by coronaviruses, adenoviruses, and rhinoviruses tend to be self-limiting and primarily affect the upper respiratory tract in young immunocompetent patients with no previous medical history. However, in some cases, these viruses can become highly virulent. This study describes two cases of severe acute respiratory infections in patients aged 19 and 18 years from a military garrison in the Colombian Caribbean. Both patients had no relevant clinical history and presented with severe acute respiratory symptoms with a torpid clinical course that led to a fatal outcome within 48 h after admission. The patients were initially treated for symptoms associated with systemic inflammatory syndrome. Both patients had fatal acute respiratory infections, and coronavirus HKU1, rhinovirus/enterovirus, and adenovirus were detected in both patients. Both patients died of cardiorespiratory shock. Clinical cases highlight the importance of epidemiological surveillance in crowded environments, such as military barracks, and the environment in which the patients lived, where respiratory infections can spread easily and promote co-infections.

Keywords: Pneumonia Viral; Military Personnel; Systemic Inflammatory Response Syndrome; Fatal outcome; Public health

Infección respiratoria aguda fatal en dos adultos jóvenes por coronavirus HKU1, y rinovirus/enterovirus en un área del caribe colombiano

Resumen

Las infecciones respiratorias agudas causadas por coronavirus, adenovirus y rinovirus tienden a ser autolimitadas y afectan principalmente las vías respiratorias superiores en pacientes jóvenes, inmunocompetentes y sin antecedentes médicos. Sin embargo, en algunos casos, estos virus pueden volverse altamente virulentos. Este estudio describe dos casos de infecciones respiratorias agudas graves en pacientes de 19 y 18 años de una guarnición militar en el Caribe colombiano. Ambos pacientes no presentaban antecedentes clínicos relevantes y presentaron síntomas respiratorios agudos graves con una evolución tórpida que culminó en la muerte dentro de las 48 horas posteriores al ingreso. Inicialmente, los pacientes fueron tratados por síntomas asociados con el síndrome inflamatorio sistémico. Ambos pacientes presentaron infecciones respiratorias agudas mortales, y se detectaron coronavirus HKU1, rinovirus/enterovirus y adenovirus en ambos. Ambos pacientes fallecieron por shock cardiorrespiratorio. Los casos clínicos resaltan la importancia de la vigilancia epidemiológica en entornos concurridos, como cuarteles militares, y en el entorno donde vivían los pacientes, donde las infecciones respiratorias pueden propagarse fácilmente y promover la coinfección.

Palabras clave: Neumonía Viral; Personal Militar; Síndrome de Respuesta Inflamatoria Sistémica; Desenlace fatal; Salud pública.

Introduction

Acute respiratory infections (ARI) of viral origin are a common reason for consultations at primary care centers. Although new prevention strategies are being identified, knowledge of the relationships between respiratory viruses remains limited[1]. Routine virus identification is not possible in clinical practice.

Viruses are frequent causal agents of acute respiratory infections, and the most common are influenza virus, respiratory syncytial virus (RSV), human parainfluenza virus (HPIV), human metapneumovirus (HMV), rhinovirus (RV), adenovirus (AdV), and four endemic human coronaviruses (HCoV) -229E, -NL63, OC43, and HKU1[2]. Seven human coronaviruses (HCoVs) have been identified: HCoV-229E, HCoV NL63, HCoV-

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OC43, HCoV-HKU1, severe acute respiratory syndrome coronavirus (SARS-CoV), Middle East respiratory syndrome coronavirus (MERS-CoV), and severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2). The first four HCoVs are the most common, have coexisted with humans for a long time, and have low pathogenicity[3]. Studies have found that common HCoVs are widespread and frequent during winter. Approximately 30-50% of HCoV infections are co-infections with other respiratory pathogens. Co-infection is a risk factor for severe disease and high mortality rates[3].

According to their molecular and antigenic properties, enteroviruses are classified into seven genotypes associated with human diseases (Enterovirus A-D and Rhinovirus A-C)[4]. Human rhinoviruses have a tropism for the respiratory tract, and enteroviruses infect the gastrointestinal tract, central nervous system, respiratory tract, and other organs, such as the heart, causing significant morbidity and mortality worldwide[4].

This report describes two fatal ARIs due to the coronavirus HKU1 and Rhinovirus/Enterovirus in two young adult patients from a Colombian Caribbean area; they lived in a military garrison, and the cases occurred during the seasonal peak corresponding to epidemiological week 22, in which the cases reported at the national level exceeded the seasonal threshold[4].

Case descriptions

In June 2024, a 19-year-old young adult with no relevant medical history, who was a resident of a military garrison, was admitted to the first-level emergency department with a clinical history of five days of evolution. The patient was admitted with an altered state of consciousness with psychomotor agitation and disorientation, associated with fever peaks quantified at 39°C, tachycardia (170 beats/min), arterial hypertension, tachypnea (42 rpm), use of accessory muscles, and desaturation (92%) with support from a nasal cannula with Fio2 32%. During his stay in the first-level care unit, laboratory tests revealed leukocytosis, neutrophilia, hyperglycemia, and increased acute-phase reactants, indicative of a systemic inflammatory response due to sepsis. Physical examination revealed dry oral mucosa and bibasilar crepitus, with apparent facial muscle and upper limb fasciculations.

Two hours after his stay in the first-level unit, he presented with acute deterioration of his state of consciousness without response to verbal or physical stimuli and was intubated. Subsequently, he was transferred to a higher-level hospital. Nasal secretion samples were collected, and the BioFire™ respiratory panel 2.1 molecular method was used (Fig 1) to detect Coronavirus HKU1 and Rhinovirus/Enterovirus. The patient was admitted due to facial cyanosis, sphincter relaxation, hypotension, bradycardia, and oxygen desaturation (46%). Minutes after admission, the patient experienced cardiorespiratory shock and died. At the time of admission, two presumptive diagnoses were established: neuroinfection due to altered consciousness and abnormal movements. However, this was ruled out by histopathological examination of the brain tissue from the autopsy. The second presumptive diagnosis was ARI, which was compatible with the clinical evolution, molecular detection, and histopathology of lung and tracheal parenchymal tissues. The timeline of the clinical events is shown in Fig 2.

The second case involved an 18-year-old patient from the same military garrison who was admitted to the emergency room with fever associated with psychomotor agitation, dehydration, tachycardia, tachypnea, and hypoventilation on pulmonary auscultation. The patient developed torpid evolution minutes after admission, with worsening tachycardia (162 beats/min), elevated blood pressure (172/96 mm/h), and abundant respiratory secretions. Baseline crackles were evident on pulmonary auscultation, with desaturation (92%) on oxygen support and an FiO2 of 32% at sea level. The condition was accompanied by severe tachypnea (42 bpm), fever (40.9 °C), deterioration of consciousness, and abnormal movements described as myoclonic. Owing to the severity of the patient's condition, she was transferred to a more complex clinical center under suspicion of febrile convulsions with a diagnosis of acute poisoning by unknown substances. During transfer, the patient remained tachycardia (120-145l pm) and febrile (39.5 °C). The patient entered the clinical center in poor general condition, stuporous, desaturated (85%), generalized rigidity, and low blood pressure with a tendency for hypotension, and crackles in both lung fields. He was transferred to the resuscitation room, where he died of a cardiorespiratory shock.

Result Summary	
Viruses	
Not Detected	Adenovirus
Not Detected	Coronavirus 229E
✓ Detected	Coronavirus HKU1
Not Detected	Coronavirus NL63
Not Detected	Coronavirus OC43
Not Detected	Severe Acute Respiratory Syndrome Coronavirus 2 (SARS-CoV2-)
Not Detected	Human Metapneumovirus
✓ Detected	Human Rhinovirus/Enterovirus
Not Detected	Influenza A
Not Detected	Influenza B
Not Detected	Parainfluenza Virus 1
Not Detected	Parainfluenza Virus 2
Not Detected	Parainfluenza Virus 3
Not Detected	Parainfluenza Virus 4
Not Detected	Respiratory Syncytial Virus
Bacteria	
Not Detected	*Bordetella parapertussis* (IS*1001*)
Not Detected	*Bordetella pertussis (ptxP)*
Not Detected	*Chlamydia pnmeumoniae*
Not Detected	*Mycoplasma pneumoniae*

Figure 1. Results of the respiratory panel in both cases.

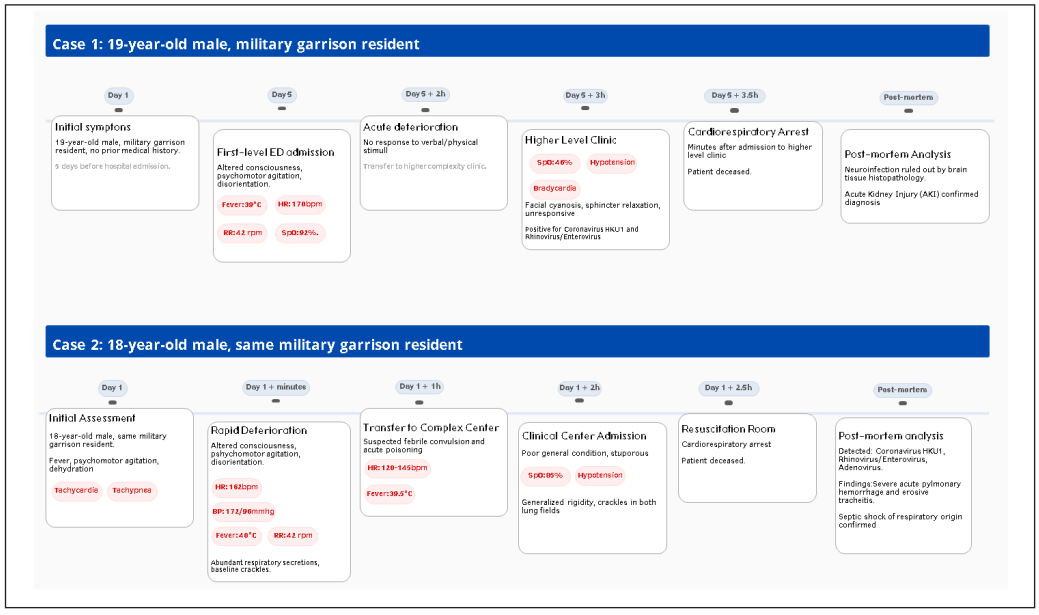

Figure 2. Timeline of clinical chronology events with a fatal outcome of both cases.

Laboratory tests showed metabolic acidosis, moderate hypokalemia, hyponatremia associated with severe hypochloremia, blood count with severe leukocytosis, marked neutrophilia, elevated coagulation times, and elevated lactate dehydrogenase (LDH), procalcitonin, and C-reactive protein (CRP) levels. Chest radiography showed cardiomegaly, no parenchymal lesions in the lungs, and no germs isolated in blood, urine, or bronchial secretion cultures. However, upon admission, coronavirus HKU1 and Rhinovirus/Human enterovirus were detected in the nasopharyngeal discharge using molecular methods (BioFireÔ Respiratory Panel 2.1). Postmortem, adenovirus was also detected using RT-PCR and CDC Protocol. At the time of death, presumptive diagnoses of septic shock of respiratory origin and neurological infection were made. Postmortem studies ruled out acute infection of the central nervous system; however, severe acute pulmonary hemorrhage and erosive tracheitis were observed. The timeline of the clinical events is shown in Figure 2.

Discussion

Severe acute respiratory infections (SARIs) are dangerous diseases in children under 5 years of age, older adults, and in individuals with underlying health conditions. These infections can exhibit different levels of lethality depending on the patient's immunological status and the virus involved in the infection. The most frequent SARIs are caused by respiratory syncytial virus, especially in pediatric patients. Other viral agents include the influenza virus, adenovirus, enterovirus, and non-SARS coronaviruses. SARIs not only cause temporary discomfort but can also present serious complications, such as severe pneumonia, which often requires hospitalization and intensive care. The impact of viral respiratory infections should always be interpreted considering population vulnerability (immunocompetent vs. immunocompromised patients), living conditions—for example, overcrowding in military populations or prisons, where proximity increases vulnerability to these infections—and clinical red flags that might suggest complications, such as pneumonia or sepsis.

In Colombia, notifications have been seasonal for the past seven years. In epidemiological week 39 of 2024, 5,290,897 medical visits for SARIs were reported, mostly in outpatient clinics and in emergency departments. Most viral respiratory infections have seasonal patterns, and the prevalence of respiratory viruses varies according to the method, geographic area, and population. In our study in the Caribbean region, seasonality was marked by rainy and dry seasons, which could have a minor influence on the study area. However, knowledge of local epidemiology is crucial for implementing prevention and treatment strategies.

ARI caused by coronavirus, rhinovirus/enterovirus, and adenovirus in adults tends to be self-limiting and is characterized by respiratory symptoms such as rhinorrhea, odynophagia, dry cough, and fever below 39°C[7]. Cases of severe pneumonia caused by these viruses are more frequent in immunocompromised adults and are the main etiological agents of the common cold[2,7]. The host immune response is essential for patient recovery. However, the deregulated response of the immune system can cause a cytokine storm that probably leads to the rapid clinical deterioration and lung lesions described in both cases[7]. The patients presented with elevated inflammatory markers, such as CRP, LDH, and procalcitonin. Although bacterial co-infection is common, aggravates the condition, and worsens the prognosis[7], no bacterial co-infections were found in the present study. In both cases, the risk of overcrowding has been associated with outbreaks of respiratory infections[6]. An outbreak of ARI occurred at a recruitment center in Thailand, and the viruses described in the

present study were isolated. In addition, bacterial co-infection with *Pseudomonas aeruginosa*, an unusual germ in cases of community-acquired pneumonia, has been reported[8]. In both cases, respiratory secretion cultures were negative for bacterial growth.

Considering that the isolation of the germs causing pneumonia is complex, and it has been described that the pathogen causing the pneumonic condition is identified in only 38% of patients[8], in our cases, possible co-infection could not be ruled out. However, the viral etiology was evident at the time of case closure. Additionally, quantifying viremia may be essential for establishing disease severity. The high prevalence of viremia and its association with disease severity suggest that viremia may be a relevant pathophysiological event with important translational implications for respiratory viral infections[7]. Therefore, it is essential to conduct a study in Colombia that measures viremia and its clinical outcome.

Mortality due to human coronavirus (HCoV) infection is rare in patients without comorbidities. In Brazil, 16,225 SARI cases were reported over 5 years, with 1,582 deaths and a mortality rate of 9.8%. Nineteen patients had no comorbidities, and the cause of death was attributed to HAIs caused by coronavirus and rhinoviral infections. Within this group, only three patients were young adults and presented with symptoms of fever, cough, respiratory distress, dyspnea, and desaturation in less than 95% of cases[9]. HAIs caused by rhinovirus/enterovirus in immunocompetent adults rapidly progress to respiratory distress. The mortality rate in 653 patients with rhinovirus/enterovirus HAIs was 0.76%, and five patients had no comorbidities[5].

Within the epidemiological framework, it has been described that the three isolated viruses are frequent in the military population, which is at a high risk of acute respiratory infections due to close contact between personnel and living in semi-closed spaces[6]. Regarding the adenovirus detected postmortem in the second patient, we do not know whether it played a role in the clinical outcome.

In a prospective cohort study conducted at a military training center in Thailand, 30% of recruits presented with acute respiratory infections within 10 weeks[6]. These data are similar to those of another study on military bases in the USA[10]. In the latter, prevention and health promotion measures, such as hand hygiene, were implemented, resulting in a 45% decrease in ARI cases in that population[10]. The clinical history of the recruits in our study revealed that both patients had fever for several days, and at the time of consultation, the patients had clinical and paraclinical data indicating sepsis, which indicated an advanced disease course. Untimely consultation likely contributed indirectly to the fatal outcome of this case.

In the present study, the initial symptoms of fever, agitation, and alterations in the state of consciousness progressed to severe complications in the patients' health, culminating in cardiorespiratory arrest and fatal outcomes that correlated with septic shock.

In conclusion, the potential severity of ARI in young adults should be considered in the clinical presentation, which is sometimes underestimated in previously healthy patients. However, clinical manifestations such as persistent high fever, progressive dyspnea, and hypoxemia may serve as early indicators of a more severe viral process that requires close monitoring and treatment. Detection of viral agents using molecular techniques highlights the need for earlier diagnostic strategies that allow prompt identification of the type of infection and optimize clinical management of the disease. However, potential barriers, such as limited healthcare infrastructure in rural areas, delayed access to specialized care, and insufficient epidemiological surveillance capacity, may hinder timely diagnosis and intervention. This report encourages the improvement of public health and medical care strategies in population groups with high population densities, which increases the risk of ARI outbreaks.

Ethical considerations

Protection of persons. The location of the military garrison and second-level clinic where the patients were treated were omitted to avoid associations between time and place. The procedures were carried out following the ethical standards for the participation of humans according to the World Medical Association and the Declaration of Helsinki available at: https://www.wma.net/what-we-do/medical-ethics/declaration-of-helsinki/. In addition, the guidelines of Resolution 8430 of 1993 of the Ministry of Health of Colombia were followed, according to which the analysis of the cases was classified as risk-free.

Protection of vulnerable populations. This retrospective study was based solely on a document review. The data were handled anonymously and confidentially. The guidelines of Resolution 8430 of 1993 of the Ministry of Health of Colombia were followed.

Confidentiality. Patient confidentiality and anonymity were guaranteed.

Privacy. Patient confidentiality and anonymity were guaranteed. Anonymity and confidentiality were ensured without the use of names, initials, or hospital record numbers, in accordance with national regulations and the Declaration of Helsinki. Hence, the guidelines of Resolution 8430 of 1993 of the Ministry of Health of Colombia were followed.

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Conflict of interests. The authors have no conflict of interest to declare.

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Authors´ contribution. Conceptualization: DP, AA, SM, AA, DB, and GA. Case presentation methodology: AA, DP, SM; Analysis, discussion, conclusions: DP, AA, SM, AA, DB, and GA. All authors contributed to read and approved the version of the submitted manuscript.

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