Since January 2020 Elsevier has created a COVID-19 resource centre with free information in English and Mandarin on the novel coronavirus COVID-19. The COVID-19 resource centre is hosted on Elsevier Connect, the company’s public news and information website.

Elsevier hereby grants permission to make all its COVID-19-related research that is available on the COVID-19 resource centre - including this research content - immediately available in PubMed Central and other publicly funded repositories, such as the WHO COVID database with rights for unrestricted research re-use and analyses in any form or by any means with acknowledgement of the original source. These permissions are granted for free by Elsevier for as long as the COVID-19 resource centre remains active.
Case report

Human bocavirus detection in an atopic child affected by pneumonia associated with wheezing

Chiara Terrosi a, Massimiliano Fabbiani b, Carla Cellesi b, Maria Grazia Cusi a, *

a Department of Molecular Biology, Microbiology Section, University of Siena, Policlinico “S. Maria Le Scotte”, Viale Bracci 1, 53100 Siena, Italy
b Infectious Diseases Section, University of Siena, Policlinico “S. Maria Le Scotte”, Viale Bracci 1, 53100 Siena, Italy

Received 13 June 2007; received in revised form 28 June 2007; accepted 29 June 2007

Abstract

Background: Human bocavirus (HBoV) is a newly discovered human parvovirus. HBoV was detected in respiratory samples by PCR, but its aetiologic role in the pathogenesis of acute respiratory infectious diseases is still unclear.

Results: In this report, we describe an atopic child affected by pneumonia, with a past history of wheezing. A panel of bacteria and respiratory viruses were searched in the nasopharyngeal swab, only human bocavirus was detected by PCR.

Conclusions: Detection of HboV, as the only microbial agent, in samples from children with wheezing and acute respiratory diseases supports the assumption that this emerging virus could have an aetiologic role in the pathogenesis of respiratory diseases.

© 2007 Elsevier B.V. All rights reserved.

Keywords: Bocavirus; Pneumonia

1. Introduction

Screening of most of the known respiratory viruses by PCR has allowed us to diagnose many viral infections in the majority of individuals with respiratory illnesses. However, many respiratory infections still remain undiagnosed. A new parvovirus, the human bocavirus (HBoV), has recently been discovered by the application of random PCR/cloning technique on respiratory samples (Allender et al., 2005). HBoV is suspected to be an etiologic agent of respiratory disease in humans (Manning et al., 2006; Maggi et al., 2007; Kesebir et al., 2007). Respiratory distress and abnormal radiographic chest findings have frequently been associated with HBoV. However, its causative role is still unclear. Most viruses have been identified by animal experiments or virus replication in tissue culture, but this virus was discovered by molecular screening of respiratory tract samples and it has not yet been grown in cell culture. Although, Koch’s postulates have provided a standard for establishing a causal link between a pathogen and disease, in this case it was not possible to apply these rules. However, the frequent association of HBoV infection with respiratory tract disease (Anderson, 2007; Schenk et al., 2007; Simon et al., 2007) led us to consider this virus as a causative agent for respiratory tract diseases. Some studies have shown that HBoV is distributed all over the world (Manning et al., 2006; Maggi et al., 2007; Simon et al., 2007; Ma et al., 2006; Bastien et al., 2007) and recent data have shown that it can also be detected in stool samples from children with gastroenteritis (Vicente et al., 2007). Like other viruses, it is possible that HBoV could be involved in both respiratory and enteric diseases.

2. Results

In this report, we describe a case of pneumonia and severe wheezing associated with HBoV DNA in the pharyngeal swab sample from a child. Informed consent was obtained from the parents of the child who provided specimens.
The child had been hospitalized at the age of 1 year due to rhinitis, airflow obstruction and acute wheezing. He was treated with corticosteroids and inhalative bronchodilators to control bronchoconstriction. No antibiotics were administered. No causative agent was found in nasopharyngeal swab or serological tests and no sign of chronic lung disease was present when he was released. During the following year, he frequently suffered from respiratory tract infections associated with bronchoconstriction. In order to understand the cause of bronchoconstriction, total and specific IgE were measured and high values were reported for egg proteins.

He was 3 years old when admitted for the most recent episode of respiratory distress. Clinical examination revealed a weakened general condition, a body temperature of 38 °C, tachycardia (pulse rate 140 per min), tachypnea (respiratory rate 52 per min), dyspnea, subcostal retractions, wheezing and left apical fine rales upon lung auscultation. Laboratory tests showed a leukocyte count of 22.0 × 10⁹ l⁻¹, and C-reactive protein and erythrocyte sedimentation rate were normal. Chest radiography, interpreted by a paediatric radiologist, revealed hyperinflation and pneumatic infiltrates of the upper left lobe. Transcutaneously measured oxygen saturation was decreased to 82% while breathing ambient air and the patient required oxygen supplementation (8 l/min) and inhalative adrenaline. Oxygen was given for an additional 3 days along with intravenous corticosteroids and salbutamol by inhalation for persistent bronchoconstriction. The child improved and was dismissed from hospital after 7 days.

To assess the aetiology of this respiratory disease, blood and nasopharyngeal swab were drawn from the patient upon admission and tested for the presence of viral, bacterial and fungal pathogens. No infectious agent was detected by bacterial or fungal culture. The nasopharyngeal swab was also tested by PCR for Chlamydia pneumoniae, Mycoplasma pneumoniae, Bordetella pertussis and Legionella pneumophila, respiratory syncytial virus (types A and B), metapneumovirus, influenza viruses (types A–C), parainfluenza viruses (PIV-1, PIV-2, PIV-3 and PIV-4), rhinovirus, enterovirus, adenovirus, coronavirus (HcoV-OC43, HcoV-H1956, NL63 and HKU11) and human bocavirus. The only positive result was obtained for HBoV, using the primers described by Simon et al. (2007). Briefly, 5 μl of DNA (extracted from 200 μl of sample by using QIAamp mini kit; QIAGEN, Milan, Italy) was amplified using the forward primer 5′- CCAAGAAACGTCGTCCTAAC 3′ (HBoV nt 2301-2320) and the reverse primer 5′ GTGTGACT-GAATACGTTG 3′ (HBoV nt 2681-2700), producing a fragment of 399 bp, partly overlapping the NPA gene. The cycling conditions were: an initial step at 94 °C for 5 min, followed by 40 cycles at 94 °C for 40 s, 48 °C for 40 s and 72 °C for 1 min; and a final incubation at 72 °C for 5 min.

The sensitivity of this PCR was very high, detecting up to 10 copies of HBoV genome (Fig. 1). Virus detection was confirmed by sequence analysis of the PCR product. Another specimen drawn from the child one month after he was discharged from the hospital was negative for HBoV by PCR.
of respiratory tract samples. Proc Natl Acad USA 2005;102:12891–6.

Anderson LJ. Human bocavirus: a new viral pathogen. Clin Infect Dis 2007;44:911–2.

Bastien N, Chui N, Robinson JL, Lee BE, Dust K, Hart L, et al. Detection of human bocavirus in Canadian children in a 1-year study. J Clin Microbiol 2007;45:610–3.

Kesebir D, Vazquez M, Weibel C, Shapiro ED, Ferguson D, Landry ML, et al. Human bocavirus infection in young children in the United States: molecular epidemiological profile and clinical characteristics of a newly emerging respiratory virus. J Infect Dis 2007;194:1276–82.

Manning A, Russell V, Eastick K, Leadbetter GH, Hallam N, Templeton K, et al. Epidemiological profile and clinical associations of human bocavirus and other human bocavirus and other parvoviruses. J Infect Dis 2006;194:1283–90.

Maggi F, Andreoli E, Pifferi M, Meschi S, Rocchi J, Bendinelli M. Human bocavirus in Italian patients with respiratory diseases. J Clin Virol 2007;38:321–5.

Ma X, Endo R, Ishiguro N, Ebihara T, Ishiko H, Ariga T, et al. Detection of human bocavirus in Japanese children with lower respiratory tract infections. J Clin Microbiol 2006;44:1132–4.

Schenk T, Huck B, Forster J, Berner R, Neumann-Haefelin D, Falcone V. Human bocavirus DNA detected by quantitative real-time PCR in two children hospitalized for lower respiratory tract infection. Eur J Clin Microbiol Infect Dis 2007;26:147–9.

Simon A, Groneck P, Kupfer B, Raiser R, Plum G, Tillmann R-L, et al. Detection of bocavirus DNA in nasopharyngeal aspirates of a child with bronchiolitis. J Infect 2007;54:327–8.

Vicente D, Cilla G, Montes M, Pérez-Yarza E, Pérez-Trallero E. Human bocavirus, a respiratory and enteric virus. Emerg Infect Dis 2007;13:636–7.