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A Case of Pneumonia Due to Co-İnfection of Two Different Viruses

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ABSTRACT:

A case of pneumonia due to co-infection of two different viruses

Objective: Community acquired pneumonia (CAP) is the leading cause of death in the world, especially for small children. There are wide range of etiological agents varying according to age. As conventional culture methods require longer test times for viral and atypical pathogens, nucleic acid tests with higher sensitivity and specificity are advantageous for rapid detection and due to detection of several different agents in the same sample, multiplex polymerase chain reaction (PCR) test offers rapid diagnosis.

Case: In this paper, we report a 4 year-old boy with two different viral co-infection (H1N1 and human metapneumovirus infection) causing pneumonia.

Conclusion: This case higlights the importance of detection of viral causes in the etiology of pneumonia, especially with PCR to avoid unnecessary antibiotic use.

Keywords: Human metapneumovirus, Influenza A (H1N1), Multiplex PCR, Pneumonia

ÖZET:

İki farklı virusun ko-infeksiyonu nedeniyle gelişen bir pnömoni vakası

Amaç: Toplumda kazanılmış pnömoni, tüm dünyada özellikle küçük çocuklarda, ölümlerin en sık nedenlerinden birisidir. Etiyolojide yaşa gören değişen çok çeşitli etkenler bulunmaktadır. Konvansiyonel kültür yöntemleri, viral ve atipik patojenler için uzun zaman gerektirdiğinden, nükleik asid testleri yüksek sensivite ve spesifite özelliğine ek olarak hızlı tanı avantajı sağlamaktadır. Aynı örnekte çeşitli farklı etkenleri tespit edebilmesi nedeniyle multipleks polimeraz zincir reaksiyonu (PCR) metodu ile hızlı teşhis sağlamaktadır.

Olgu: Bu yazıda 4 yaşında bir erkek çocukta ağır seyirli bir pnömoni/plevral effüzyon olgusu sunulmuştur. Hastada etken olarak H1N1 virüsü ve human metapnömovirusun eşzamanlı varlığı PCR metodları ile ortaya konmuştur.

Sonuç: Bu vaka, pnömoni etyolojisinde viral nedenlerin araştırılmasının, özellikle PCR ile gereksiz antibiyotik kullanımından kaçınılmasının önemini vurgulamaktadır.

Anahtar kelimeler: Human metapnömovirus, Influenza A (H1N1), Multipleks PCR, Pnömoni

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INTRODUCTION

Community acquired pneumonia (CAP) is the leading cause of death in the world, especially in the first two years of life (1). The common etiologic agents of CAP vary according to the age. Wide range of etiological agents are responsible for the pneumonia. In pediatrics, Streptococcus pneumonia and Haemophilus influenza are the most detected bacterial organisms between 2-59 months (2). After clinical diagnosis of CAP, empirical antibiotic is the mainstay of treatment. Several viruses and their combinations can cause the infection. Up to 60% of the patients are associated with respiratory virus infections, so unnecessary and ineffective antibiotic treatment may often be used (3). Sputum culture is used for the determination of etiology. But the diagnostic material may influenced by specimen collection, transport, rapid processing and correct use of cytological criteria (4). As conventional culture methods require longer

test times for viral and atypical pathogens, nucleic acid tests with high sensitivity and specificity are advantageous for rapid detection. In addition to detection of several different agents in the same sample, multiplex PCR offers rapid diagnosis (5).

The clinical impact of mixed infections has not been fully evaluated. In this paper, we report a case of pneumonia with two different viral co-infection.

CASE REPORT

A 4-year-old, previously healthy child was admitted to our hospital with complaints of fever, cough, dyspnea and chest discomfort for 3 days with intercostal and suprasternal retractions. He was refusing taking food and liquids. On his medical history all the vaccinations were performed according to age except influenza. On physical examination, he appeared ill and had difficulty in breathing. His temperature was 39.2°C, heart rate was 108 beats per minute, respiratory rate was 42 breaths per minute, blood pressure was 90/65 mm Hg, and oxygen saturation (SpO2) on room air was 92 mm Hg. Chest auscultation revealed inspiratory crackles in both lung fields and diminished breath sounds on the lower part of right lung. A chest radiograph showed right lung central consolidation and small left lung retrocardiac consolidation. Also note that there is right pleural effusion (Figure-1). The results of laboratory tests revealed hemoglobin level 12 mg/dl, white blood cells $6.2x10^9$/l (neutrophils 52.9%, lymphocytes 36.9%, monocytes 8.8%, and eosinophils 0.2%), platelet count was $183X10^9$/l and C-reactive protein 0.4 mg/L (N:<0.5 mg/L). Antibiotic therapy (ceftriaxone sodium 100mg/kg/day), oxygen and intravenous liquid supplementation were started for presumed bacterial pneumonia in the department of pediatrics at hospital. During the next 48 hours, his respiratory status worsened. Despite prompt resolution of fever, general condition did not improve and retractions increased and Sp02 remained 93% rising to 95% with oxygen supplementation. A chest radiograph obtained third day of admission showed progression in right pleural effusion and left retrocardiac consolidation (Figure-2). A computed tomography (CT) scan on the fifth day of admission demonstrated massive right

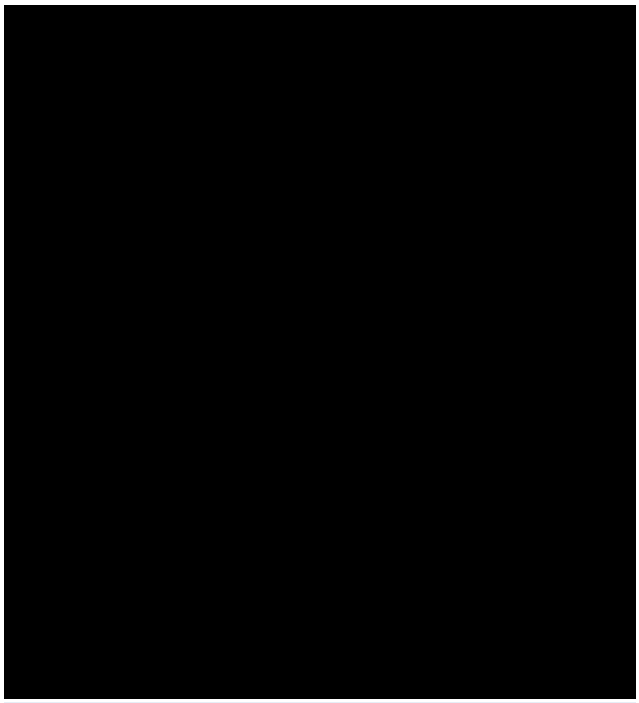

Figure-1: Chest radiograph shows wide consolidation in middle and lower zone of right lung. Also there is small consolidation in left lung lower zone. Note there is accompanying right pleural effusion.

Figure-2: Chest radiograph obtained on the third day following admission shows increase in right pleural effusion. Consolidation in right lung is masked by pleural effusion. Left lung retrocardiac consolidation increased over time.

pleural effusion compressing lung. CT also revealed minimal left pleural effusion (Figure-3a, b). The drainage was made with tube thoracostomy by the pediatric surgery. Pleural fluid was clear, cell count was 233/mm^3 (lymphocytes), lactate dehydrogenase (LDH) 47 U/L, pleural fluid: serum LDH ratio <0.6, pleural fluid: serum protein ratio <0.5, pH and glucose were in normal ranges. Liquid from the pleural space analyzes indicated parapneumonic pleural effusion as transudate as a composition. The Gram stain was negative for microorganisms. Cultures of blood, pleural fluid, urine and sputum specimens did not show growth of any pathogenic organisms. Rapid antigen test was found negative for influenza. Nasopharyngeal swab result was positive for human metapneumovirus and Influenza A (H1N1) by polymerase chain reaction (PCR) testing and negative for other pathogens. We began antiviral treatment with oseltamivir (45 mg twice a day) and continued for 5 days. We also stopped antibiotic therapy after PCR test result. Soon after the drainage the condition improved immediately and and he was discharged from the hospital after a week.

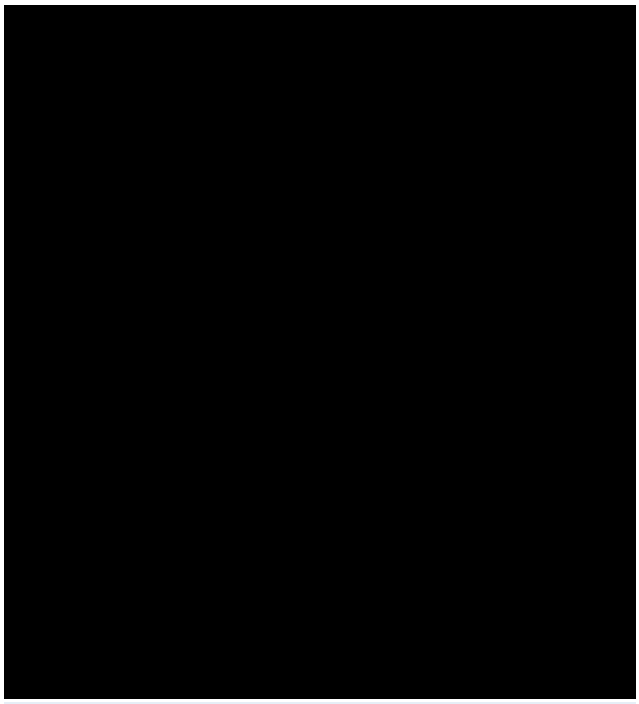

Figure-3: CT image a) with mediastinum window settings reveals massive right pleural effusion that compressed right lung (arrow). Note the high pressure of the pleural effusion that shifts heart to left. Also there is small left pleural effusion. b) with lung window settings reveals left lower lobe consolidation and linear atelectasis in lingular segment.

DISCUSSION

Human metapneumovirus (HMPV), first identified in 2001- a RNA virus of Paramyxovirus family- is a leading cause of upper and lower respiratory tract infections in children in spring and winter months as in our patient had the infection in January (6). Although researches have confirmed the prevelance of HMPV world wide, data from Turkey remained limited. Cough, wheezing, rhonchi, and dyspnea are major manifestations. The clinical features of the illness caused by HMPV infection range from a mild upper respiratory tract infection to life-threatening severe bronchiolitis and pneumonia. Epidemiologic studies have demonstrated that a greater number of children infected with HMPV are diagnosed as having pneumonia (7). Radiographic abnormalities include diffuse findings, such as perihilar infiltrates and alveolar disease, and focal findings, including bronchopneumonic changes, lobar pneumonia, and effusion (8). Bacterial superinfection can occur. HMPV was initially identified in cell culture, but viral cultures take up to 10 to 14 days and are, therefore, not useful clinically. Currently, the gold standard for diagnosis is PCR testing. In many clinical laboratories HMPV has been incorporated into multiplex diagnostic PCR assays used to simultaneously evaluate for multiple respiratory pathogens. There is no approved antiviral drug therapy against MPV.

Influenza virusus are RNA viruses from orthomyxovirus family. Human infection and effective human-to human transmission has been achieved by only 3 hemaglutinins and 2 neuroaminidases in 3 combinations: H1N1, H2N2, and H3N2 (8). The peak incidence of infection occurs earlier in the pediatric population. Influenza virus is transmitted primarily by large particle droplets, although contaminated surfaces can also spread disease. The incubation period is 1 to 4 days (mean, 2 days) (8,9). Upper respiratory tract infection (URI), laryngotracheitis (croup), bronchiolitis, and pneumonia are all possible presentations of influenza

in the younger children. Parapneumonic effusion and empyema are common complications. Accurate and rapid diagnosis of influenza infection can allow prompt initiation of antiviral therapy simultaneously limiting antibiotic use (9). Rapid antigen testing is the most commonly used method in the laboratory diagnosis of influenza infection. But the major disadvantage of rapid tests is their low and highly variable sensivity, ranging from 20% to 90%. On the other hand molecular methods of detection are replacing viral culture as the gold standard in the diagnosis of many viral infections, including influenza. Polymerase chain reaction (PCR)- based assays offer superior sensivity that are available in many laboratories. In our patient rapid antigen test was negative but PCR-based influenza assay was positive for Influenza A (H1N1). The administration of active antiviral therapy early in the course of disease has been found to shorten symptom duration and prevent the spread of virus. Although treatment should optimally be initiated within 48 hours of symptoms. It may also be beneficial in hospitalized patients and in those with severe disease, even started later in the disease course (10). We were able to begin to treatment with oral oseltamivir two days after the hospitalization according to laboratory confirmation. Co-infection of HMPV with other respiratory pathogens varies with different clinical trials. In a study Bosis et al. (11) reported nasopharyngeal swabs of the 42 HMPV-positive samples, 6 were also positive influenza viruses. Çiçek et. al. (12) on a study, detected respiratory viruses and influenza A virus subtypes using Multiplex PCR. Cebey-López et al. (13) published a paper on viral co-infections in pediatric patients hospitalized with lower tract acute respiratory infections. Studies also have found HMPV co-infection with bacterial pathogens like Streptococcus pneumonia, Mycoplasma pneumonia, and Chlamidya pneumonia (14). However, the interaction of HMPV with other etiological agents is unclear. Clinical outcome of co-infection of multiple viruses from mixed infections remains unpredictable and challenge (15).

This case higlights the importance of detection of viral etiologies especially with PCR to avoid unnecessary antibiotic use.

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