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Short communication

Pleuropneumonia resulting from varicella and COVID-19 co-infection in a 10-month-old infant

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ABSTRACT

COVID-19 is a new disease leading to respiratory complications in adults. Children appear to have more modest symptoms than adults. Varicella is often described as a benign disease in the pediatric population. However, patients with varicella and COVID-19 co-infection can develop a more serious respiratory infection. We report the case of an infant who had a co-infection with both viruses that led to pleuropneumonia. The main question in the present case concerns the link between COVID-19 and varicella infection, and the possible modulation in immune response due to the two virus infections.

1. Introduction

Novel coronavirus disease (COVID-19) has been recognized as the causal factor of severe acute respiratory syndrome in adult patients. However, preliminary evidence shows that COVID-19 in children leads to less severe disease than in adults, with a better prognosis and rare lethality [1,2]. We report the case of an infant who presented with pneumonia due to co-infection with both varicella and COVID-19.

2. Case report

A 10-month-old boy was admitted to the pediatric emergency department with dyspnea (respiratory rate: 68/min and SpO_2 of 94%), fever (39.1 °C), rhinitis, and cough. Six days earlier, he had been hospitalized for 3 days for febrile seizure due to varicella infection. On examination at admission, chickenpox polymorphic vesicles were observed all over the patient's body, and lung auscultation revealed rales and crackles in the left lung. Chest X-rays showed bilateral pneumonia and pleural effusion on the left side. On chest computed tomography (CT), we saw multiple shadows, ground-glass opacity, and pleural effusion on the left lung (Fig. 1). Laboratory investigations revealed: C-reactive protein (CRP) level of 159 mg/L, white blood cell count of 15,400/mm^3 with 5400 neutrophil and 8340 lymphocytes, and a hemoglobin level of 9.2 g/dL. The boy was admitted to the pediatric department with a diagnosis of a pleuropneumonia due to varicella infection. Pleural puncture was performed; no bacterial or viral agents were isolated with 16s polymerase chain reaction (PCR). Blood cultures were negative. A urine antigen test for *Streptococcus pneumonia* yielded negative results. In the current context of the COVID-19 pandemic, real-time fluorescence reverse-transcription PCR (RT-PCR) was performed for detection of SARS CoV-2 in respiratory tract secretions, which yielded positive results. The boy's parents were asymptomatic and were therefore not tested for COVID-19 according to French recommendations during observation. The child's family was living in social housing and the other children's case of varicella without respiratory symptoms had been reported at this institution. Treatment began with oxygen therapy, supportive treatment for fever, and also amoxicillin/clavulanic acid i.v. (150 mg/kg/day for 10 days), azithromycin per os (20 mg/kg/day for 5 days), and acyclovir i.v. (30 mg/kg three times daily for

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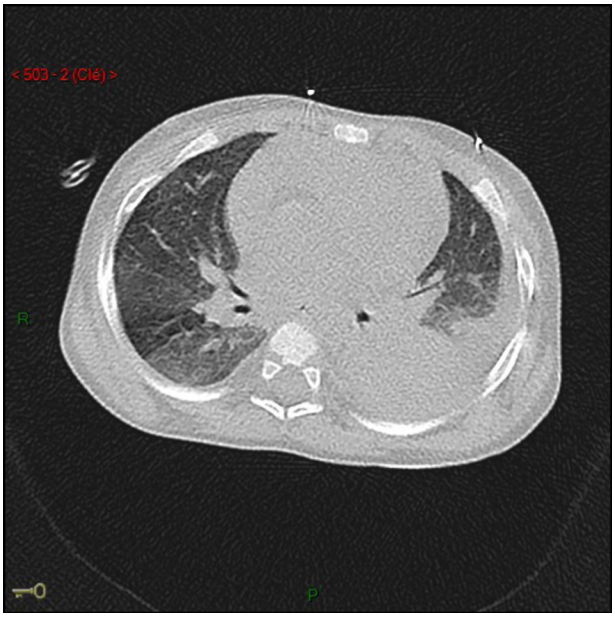

Fig. 1. Axial non-enhanced chest computed tomography (CT). There is patchy ground-glass opacification of the right lower lobe and left pleural effusion and consolidation of the lower left lobe.

10 days). Fever resolved after 6 days and on day 8 the respiratory rate was normal, no wheezing and no crackles were reported on lung auscultation. Later, on day 9, the child developed diarrhea caused by a rotavirus infection.

On day 17, a follow-up RT-PCR test was undertaken that showed negative results and chest X-ray revealed a very good evolution. Immune assessment tests evaluated immunoglobulin G, M, A, IgG subclass and total hemolytic complement levels, which were all normal.

3. Discussion

We report an association between varicella and COVID-19 infection that resulted in pleuropneumonia in an immunocompetent child. To our knowledge, no similar case has been reported to date. There is recent evidence showing an incubation period of 1–14 days for COVID-19 infection, and the duration of varicella incubation is generally approx. 14 days. The virus attack rate for SARS-CoV-2 is 2–3% and for varicella zoster virus in family clusters it is estimated to be 70%. The clinical features of this child were similar to previously described cases of COVID-19 in children (fever, cough, rhinitis, pneumonia), although one third of patients have been reported to be asymptomatic [3]. The respiratory symptoms were not specific. Chest imaging showed consolidation, ground-glass opacities, and multiple patch-like shadows [4,5]. CT can be helpful for the diagnosis if there are false-negative RT-PCR results [4]. Li et al. reported only two cases of pleural thickening in seven preschool children with COVID-19; none was punctuated [5]. In adult patients, pleural effusion was reported only in the severe/critical group (older than 50 years). In the pediatric population, COVID-19 seems to be a milder disease than in adults [3,6]. In the cohort of Dong, children younger than 12 months had more severe disease [1]. Bozzola et al. also reported that children younger than 12 months were more critically ill than older children from varicella infection [7]. No etiological treatment has been reported for COVID-19 infection but all children with respiratory symptoms received antibiotics [2,5,8]. Varicella infection-associated pneumonia is reported in 5–30% of children and requires antiviral intravenous therapy [7,9]. Pneumonia with empyema during varicella has been described in cases of infection with group A *Streptococcus* [10]. It is often difficult to separate bacterial co-infection from viral complications [7,9]. The relationship between the two viruses (COVID-19 and varicella) is not yet established. Our case raises the following question regarding pathophysiological mechanisms for which we do not have the answer: "Does the immune response to varicella virus have a moderating effect?" In the present case, we observed a rapid clinical improvement in spite of chest CT abnormalities and increased CRP levels. Diarrhea is frequent in COVID-19 infection, both in adults and in children, and it probably occurs more often in children than in adults [2]. Xu et al. recorded fecal viral excretion in pediatric cases of COVID-19 infection [11]. However, rectal swab testing was not carried out in the case described here. We were not able to find any data on co-infection with rotavirus in the literature. Viral transmission in pediatric patients is caused by close contact with family members more often or by exposure to epidemic areas [3]. Cutaneous manifestations of COVID-19 similar to chickenpox were described by Galvan Casas et al. [12] but in our case we observed a typical varicella eruption. We could not determine the history of COVID-19 exposure in our case, which is a major limitation of this report.

4. Conclusion

The association between COVID-19 and varicella should perhaps be considered a risky situation in children.

Disclosure of interest

The authors declare that they have no competing interest.

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