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Covid-19 presenting as a bulging fontanelle

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ABSTRACT

The 2019 novel coronavirus disease (COVID-19) has become a global pandemic that has struck the United States particularly hard. While it has disproportionately caused severe illness in the elderly and older adult population, many children have also been infected with the virus and some have become critically ill. It is important to recognize COVID-19 may present differently in children; specifically, those under twelve months of age. We report a case of COVID-19 infection in an infant characterized by a bulging anterior fontanelle without any additional symptoms.

1. Introduction

At the end of December 2019, the first pneumonia cases of severe acute respiratory syndrome coronavirus (SARS-CoV-2) were identified in Wuhan, China [1]. On March 11, the World Health Organization (WHO) declared coronavirus disease 2019 (COVID-19), a disease caused by SARS-CoV-2, a pandemic health emergency [2]. As of January 2021, there have been 95,612,831 cases and 2,066,176 deaths worldwide and 24,323,846 cases and 404,689 deaths in the United States alone [3,4]. Recent literature suggests that children as just as likely as adults to become infected with the virus, however, they often have fewer symptoms or less severe illness and many are asymptomatic. Although children are less likely than older adults to become severely ill, those under 12 months of age have been shown to be at higher risk for severe disease [5]. Frequent clinical manifestations in children include fever, dry cough, pharyngitis, fatigue, nasal congestion rhinorrhea, nausea, vomiting, and diarrhea [6]. The following case is a novel presentation of Covid-19: an infant with a bulging anterior fontanelle.

2. Narrative

A 4-month-old girl presented to the emergency department with a 2-day history of elevated temperature (maximum axillary temperature, 37.7 °C), some increased fussiness, decreased feeding and a bulging anterior fontanelle. She did not have any cough, nasal congestion, respiratory distress, vomiting, diarrhea or rash. There were no known sick contacts. The patient had no known risk factors for Covid-19. She was born full-term via spontaneous vaginal delivery. There were no complications with pregnancy or birth. She was gaining weight appropriately while being exclusively formula fed.

Upon presentation to the emergency department, her temperature was 37.8 °C rectally, heart rate 139 beats per minute, blood pressure 106/92 mmHg, respiratory rate 36 breaths per minute, and oxygen saturation 98% while breathing room air. Physical exam was notable for a fussy but consolable infant with a soft but bulging anterior fontanelle. Her cardiac, pulmonary and abdominal examinations were normal. Her neurologic examination was unremarkable. Otoscopic examination revealed no evidence of acute otitis media.

Laboratory investigation included blood, urine, and cerebrospinal fluid collection. The complete blood count was notable for a leukocytosis of 14.34 K/ul with 60.5% lymphocytes and the c-reactive protein was mildly elevated to 1 mg/dl (full laboratory results provided in appendix). Urinalysis was negative for leukocyte esterase and nitrites. The patient underwent a lumbar puncture. Cerebral spinal fluid (CSF) results showed 30 RBC, 1 WBC, glucose of 49, and protein of 26. CSF gram stain and CSF film array meningitis/encephalitis were negative. She was treated empirically with ceftriaxone and a 20 ml/kg normal saline bolus. CSF and blood cultures remained negative, but urine culture ultimately grew 50-100 K *E. coli*. Computed tomography was performed prior to lumbar puncture, and showed no evidence of intracranial mass, hemorrhage or hydrocephalus. A nasal swab for SARS-CoV-2 was obtained and subsequently resulted positive.

The patient was ultimately discharged home from the emergency department with outpatient follow-up with her primary medical doctor the next day. At the time of discharge, she had reassuring vital signs, an

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otherwise reassuring physical exam with improvement in her fussiness and oral intake, and no significant concern for sepsis.

3. Discussion

We provided a novel presentation of Covid-19 in a less studied but high-risk population: infants. A bulging anterior fontanelle in an infant is a sign of increased intracranial pressure (ICP) or volume and raises concerns for an intracranial process that may require emergent intervention. The differential diagnosis is broad but the most notable causes include hydrocephalus, meningitis, intracranial mass, trauma and intracranial hemorrhage [7]. If comprehensive evaluation reveals no specific cause, the diagnosis of benign intracranial hypertension may be considered in well-appearing infants. This is defined as "a syndrome of increased intracranial pressure with a normal ventricular system and a cerebrospinal fluid of normal composition." [8] Previous cases of benign intracranial hypertension with a bulging fontanelle have been described in the literature. Most cases are associated with viral illnesses including upper respiratory infections and gastroenteritis. Notably, Roseola infantum, caused by human herpesvirus 6 is a common etiology. Other etiologies such as otitis media and post-vaccination status have also been described [9-15]. In rare cases a specific etiology may not be found and may be considered idiopathic. In one study, the final diagnosis of pyelonephritis was made in 4 infants presenting with a bulging fontanelle [15]. However, unlike in our patient, these patients had evidence of pyuria on initial laboratory investigation, making the *E. coli* urinary tract infection in this patient a less likely cause of the bulging fontanelle. To our knowledge, there have been no previously reported cases of infants with SARS-CoV-2 infection presenting with a bulging fontanelle. Given that many cases of benign intracranial hypertension of infancy have a viral etiology, we suspect SARS-CoV-2 to be the etiology in our patient. This case showed that SARS-CoV-2 can have a novel presentation in infants. The rapid spread and severity of COVID-19 requires identifying all possible clinical features to help identify possible sources and prevent transmission. Therefore, we suggest consideration of SARS-CoV-2 testing as part of the evaluation of infants presenting to the emergency department with a bulging fontanelle.

Conflicts of interest

No conflicts of interest for either author.

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